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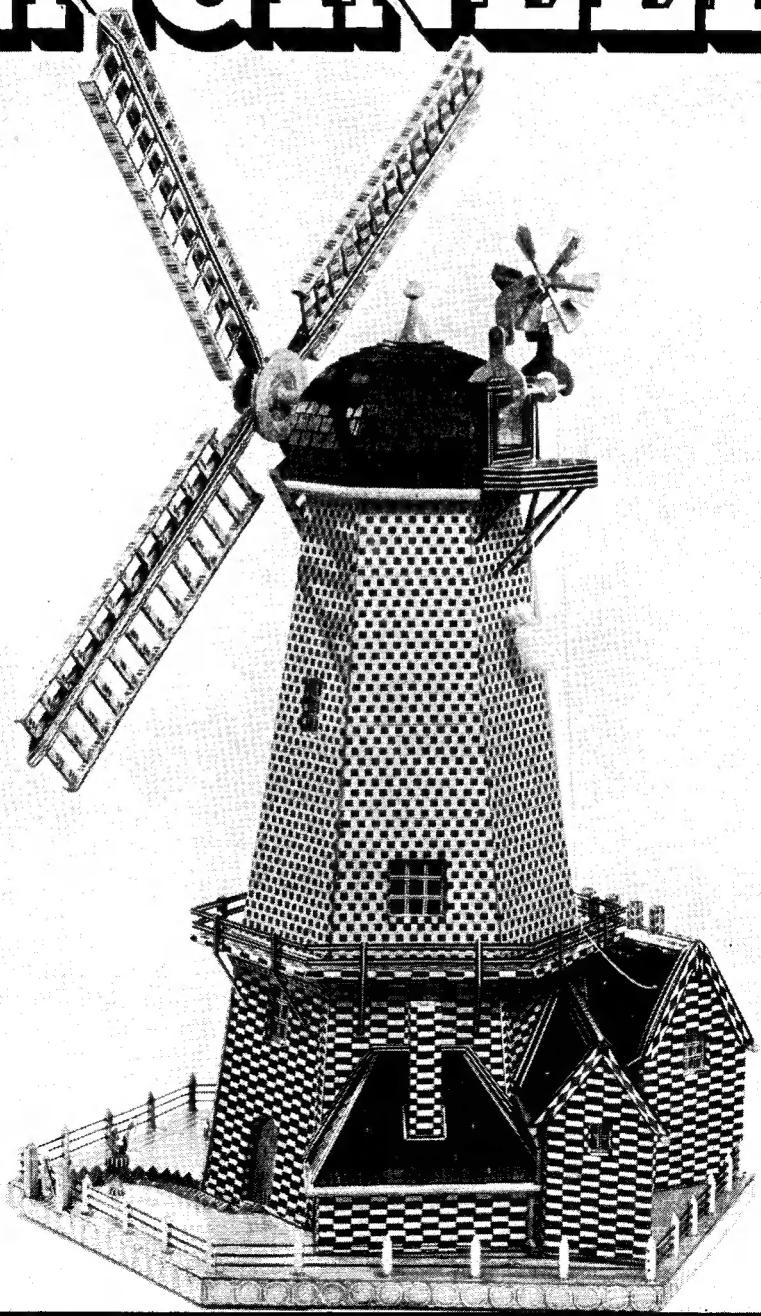
THE MODEL ENGINEER



The MODEL ENGINEER

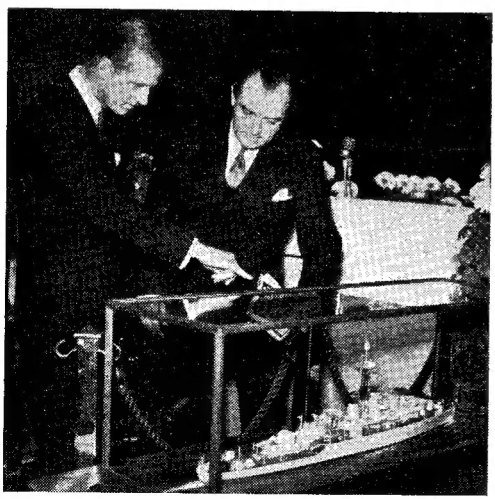
PERCIVAL MARSHALL & CO. LTD., 23, GREAT QUEEN ST., LONDON, W.C.2

30TH OCTOBER 1952 VOL. 107 NO. 2684

SMOKE RINGS

H.R.H. at the "M.E." Exhibition

● AFTER THE opening of the "M.E." Exhibition by the Duke of Edinburgh, and His Royal Highness had toured the show thoroughly, we learnt that he had enjoyed himself immensely and had been profoundly impressed by the quality of craftsmanship revealed in everything that he had examined. His searching gaze seemed to miss nothing of importance, and his rapid fire of questions kept his lucky guides busy for an hour.



H.RH.. the Duke of Edinburgh with Mr. Kenneth E. Garcke, Chairman of Messrs. Percival Marshall and Co., Ltd., examining the model of H.M.S. "Magpie" which was presented to His Royal Highness after the Opening Ceremony

It was noticeable that explanations of technical points were largely unnecessary. As he departed from the show, he was graciously generous in his warm-hearted praise. To have had the honour of being with him during his tour of the show was an experience we shall never forget.

Our Cover Picture

● THE MODEL windmill shown here was built by M. Henri Chavaux, a *chef de cuisine*, of London, S.W.1, and entered in the Scenic and Representational Models section of the "M.E." Exhibition. It is a free-lance model, embodying original ideas in constructional methods and materials. The exterior is made in plywood and marquetry, and is detachable to show floors, staircases and other internal fittings. Lighting is provided by means of batteries, which also supply current to a small motor which turns the sails. This type of model is one which can be made without a very elaborate workshop or tool equipment, but gives plenty of scope for skill and ingenuity on the part of the constructor.

The Exhibition

● THE MODEL ENGINEER Exhibition is always an object-lesson in scope and variety, and the 1952 "M.E." Exhibition was no exception in this direction. Model engineers, as a whole, are right in the forefront of versatile craftsmen, and they represent craftsmanship in all stages of its development; this was more clearly apparent than ever before, because, in addition to the usual large number of miniature reproductions of prototypes taken from engineering, marine, railway and aircraft practice, there were more examples than usual of horology, musical instruments, buildings and woodwork, as well as a carpet loom, a steam hammer and a trinket box. Home-made photographic apparatus seems to be

attracting more and more adherents. In other words, model engineers are broadening their minds and widening the scope of this all-important hobby.

One of the biggest hits of the show was the Miniature Grand Prix racing by 1/12 scale model cars ; this has become a recognised feature of model engineering exhibitions up and down the country, and we imagine that, from now on, an exhibition without its Miniature Grand Prix, or something similar, will be very much the exception.

The marine section was, once again, by far the largest in the show, and some novelties were to be found here as well. There are signs of a revival of pride in the glories of Britain's sea tradition, for ships of the Royal Navy and of almost every period of history were to be seen in large numbers. The model of H.M.S. *Magpie*, presented to H.R.H. The Duke of Edinburgh, is a beautiful job which aroused a great deal of interest and admiration ; the ship's boats on this model make an exhibition in themselves, for, although there are not many of them, they must be seen to be believed. The whole model, however, is one that was worthy of the occasion, being the work of a team comprising nine of our most expert ship modellers.

Radio-control for models has not only become an established feature but its application is extending rapidly. So far as marine models are concerned, its possibilities were fully demonstrated by various models in the large tank which was so prominent and attractive all through the show.

The later date of the exhibition had its effect upon the aircraft stands, which were more crowded than we have ever seen them before. We were glad to note that working models *to scale*, in spite of the supposed impossibility of this, were very much in evidence. There were also one or two suggested designs for aircraft, represented by actual models ; this gives practical proof of the value of model making for trying out new ideas, and the model aircraft hobby has always been of the utmost importance in this respect.

Once more, as ever, the " M.E." Exhibition proved to be the meeting-ground for old friends, as well as many new ones ; they came from near and far, even as far as Australia, and showed that THE MODEL ENGINEER is regarded with affection wherever it is read. Our exhibition is looked upon as the one event in the year when so many of our friends can make personal contact with men who cater for their needs, not only by writing articles, but also by advertising in our pages. The trade stands at the show displayed a most attractive variety of almost everything a model engineer could require, as well as many finished products that indicated great activity in the manufacturing business. We shall be publishing some detailed reviews of the show during the next few weeks.

Meanwhile, there can be little doubt that the 1952 " M.E." Exhibition was a thoroughly momentous one in every way ; the organisation and arrangements met with considerable approval ; the show itself was outstanding and its effects, we venture to think, far reaching. In short, it was an exhibition which will not be easy to beat.

Before the Show

● ON THE day that exhibition organisers first have access to the hall where an exhibition is to be staged, there is usually little to be seen beyond what looks like hopeless chaos during the first hour or two. Standfitters gather in little groups discussing plans and preparing a general routine for the progress of their work ; standholders begin a series of anxious enquiries as to when they are likely to have access to their stands, so that at least a beginning can be made in setting out the display of exhibits ; gradually, an unmusical chorus of conversation, hammering and sawing begins a mighty crescendo which threatens to become deafening ; a perceptible haze of dust induces an epidemic of coughing, and, of course, the existing lighting arrangements in the hall seem to suit nobody's convenience. Meanwhile, exhibits of all kinds begin to arrive in ever-increasing numbers, some of them carefully packed or crated, others without packing of any kind, and a vigorous attack begins on the problem of finding somewhere to put these things so that they may be safe pending the completion of the stands.

On the Saturday morning before the opening of the 1952 " M.E." Exhibition, when we arrived at the New Horticultural Hall, we expected to find something like the picture we have just described ; so far as we could remember, it had always been the same, and we did not expect anything else. We were pleasantly surprised, however, to find an unusual amount of order already apparent in every part of the hall ; there was a certain amount of noise, of course, but that is inevitable in the early stages of an exhibition of such magnitude. Before lunchtime, the whole layout of the show was clearly apparent, and credit is due to everybody, from Mr. J. W. Streeton, the Exhibition Manager, downwards, who worked with such zest and skill to see that everything was just right and worthy of the Royal occasion it was to be on the following Monday.

Overheard at the Exhibition

(1) " Did you see those magnificent models of period ships ? "
" Yes, they were very good, but the card said they were made hundreds of years ago, by a fellow called Circa ! "

(2) " What a lovely finish on the paint work of that ship ! "
" Not at all bad, but it falls down rather on the bootlegging ! "

(3) Another variant of the " left-handed screwdriver yarn " : A very capable salesman had succeeded in selling a motorised lathe to a novice. In concluding the deal, he said " Of course, you will want the motor fitted with a reversing switch." " What do I want a reversing switch for ? " asked the buyer. " Well, you might want to cut left-hand threads some time ! " (The deal came off.)

(4) Many spectators who witnessed the demonstrations of the " racing four " on the marine tank were surprised and delighted at the realism of the mechanical oarsman. One lady, however, remarked " But the really remarkable thing about it is that *they keep such perfect time* ! "

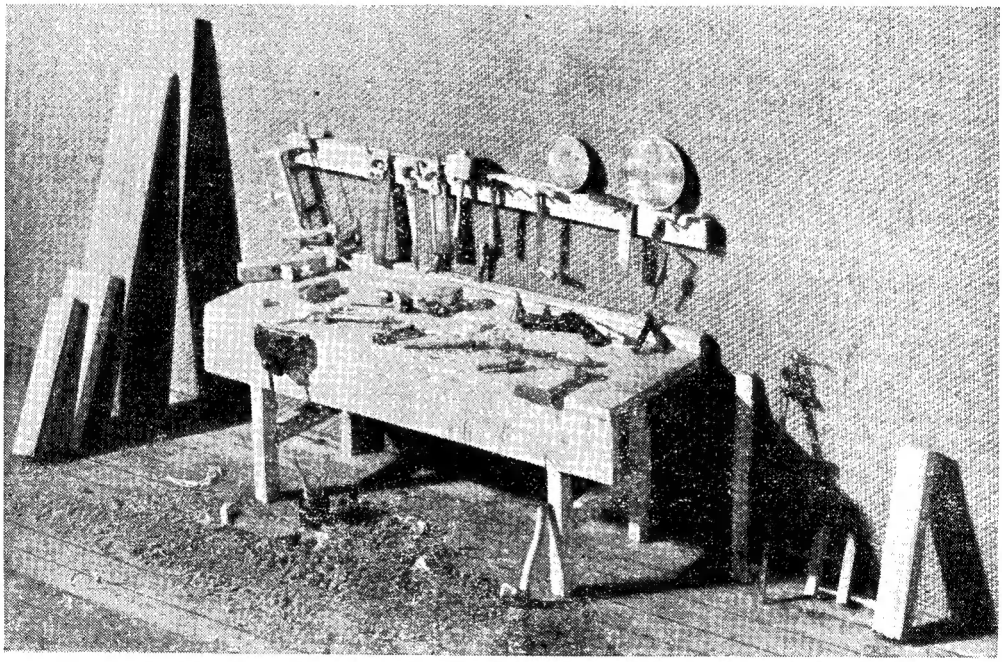
MORE COMPETITION MODELS

AT "THE MODEL ENGINEER" EXHIBITION

IN the general craftsmanship section, a miniature kit of joiners' tools, to 1/12th scale, most of which are capable of practical use, was entered by Mr. S. Haill, of South Norwood, S.E.25. Mr. D. C. T. Huston showed a miniature brass model of an oil-burning street lamp, with lead-weighted oak standard.

Models of vehicles usually figure in this section, and once more we welcomed another regular exhibitor, Mr. P. Winton, of Wembley, Middlesex, who this year produced a model of a lady's Paris chaise, to a scale of 1½ in. to 1 ft. This is a one-horse two-wheeled vehicle, having a yellow body and wheels, with black mouldings, as produced in France, and popular with Victorian ladies for driving in Hyde Park Mr V. H. Washer, of Lombard Street, E.C.3, exhibited a gipsy caravan and costers' donkey cart to a scale of ½ in. to 1 ft. ; and a "prairie schooner," or four-wheeled covered wagon, as featured in pioneering period Western films, was entered by Mr. F. Upton, of Brixton, S.W.9. The same exhibitor showed a type of model never absent from the Exhibition, namely, a ship (the *Cutty Sark*) in a bottle, and other examples of this type included a group by Mr. H. J. Hallows, of Bromsgrove, also a novelty which bears the title "Bottler's Nightmare," the description of which can well be left to the reader's imagination !

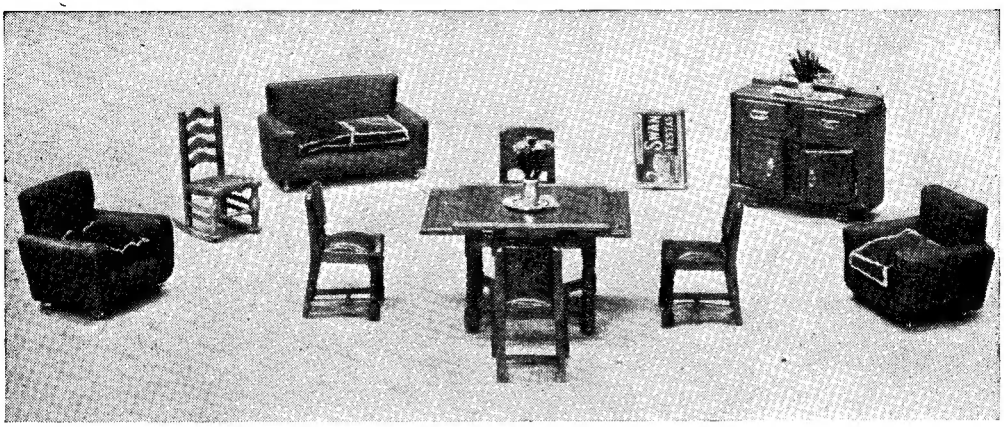
Examples of woodworking craft included a model dining room suite by Mr. H. Chapman, of Lincoln ; a trinket box in two contrasting woods, to simulate the appearance of a set of books, and enclosing an automatic musical movement, by Mr J. H. Starck, of Ruislip ; and a set-piece depicting the evolution of the cricket bat from 1750 to the present day, consisting of four bats and two sets of stumps, to a scale of 3 in. to 1 ft., by Mr. W. Lucking, of Robertsbridge, Sussex. Mr. J. W. Hendry, of East Ham, E.6, exhibited a child's pedal-driven pony and trap, and Mr. A. S. P. Watney, a pair of brass fire tongs of original design.



The set of miniature joiner's tools in a realistic setting, by Mr. S. Haill

Horological and Scientific Apparatus

Clocks are always objects of popular interest, and a "hardy annual" in this section was Mr. C. B. Reeve, of Hastings, who rarely fails to produce something of outstanding interest at each year's Exhibition. This year he exhibited a long-case 8-day striking, chiming and musical clock of his own original design. The case is of burr walnut, and the movement incorporates 19 tuned bells with their operating mechanism,

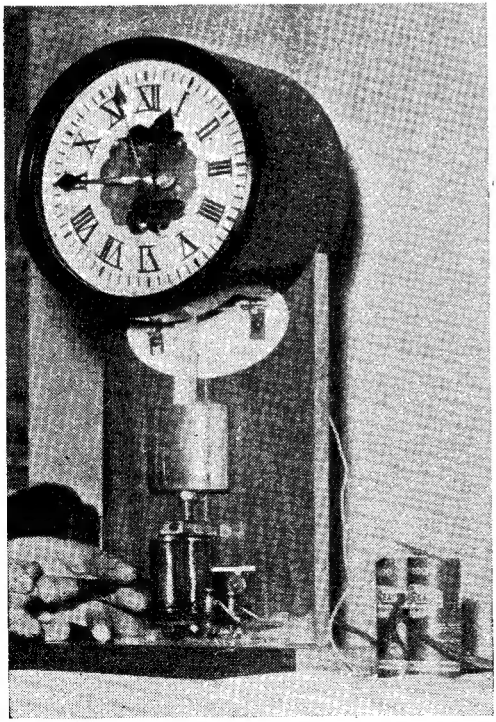


A miniature dining-room suite by Mr. H. Chapman

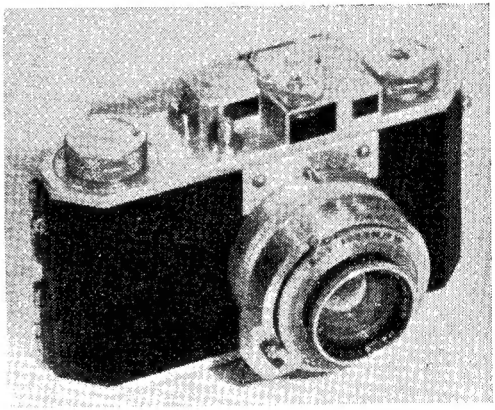
in addition to the normal time-keeping movement.

A regulator clock movement was entered by Mr. G. Warren, of Tottenham, N.17, and this incorporated a dead-beat escapement, one-second pendulum, winding and maintaining gear. The lantern clock by Mr. C. C. Allison, of Pinner, incorporated a bought movement, the case being of original design, and made of metal, engraved and pierced.

Electric battery-driven clocks included a



The " three-wheel " electric clock by Mr. J. B. Price



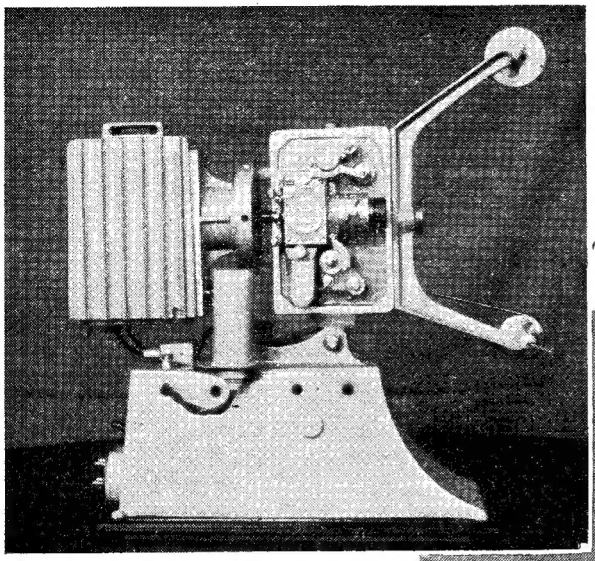
Mr. G. G. A. Pratt's 35 mm. camera

¾-sec. battery-driven clock, to a design published in THE MODEL ENGINEER, by Mr. J. C. Stevens, and a " three-wheel " clock, in which the mechanism is reduced to its simplest possible form, by Mr. J. B. Price, of Pontypool.

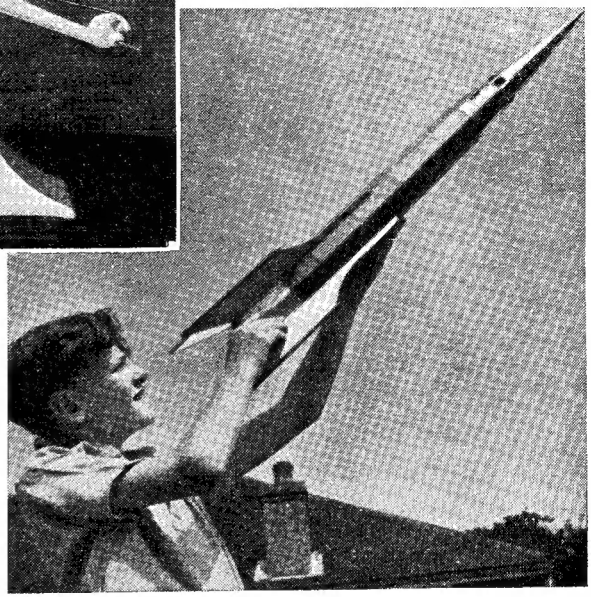
Photographic apparatus included a 35 mm. camera and flash-gun by Mr. G. G. A. Pratt, of Shepherds Bush, W.12, and a 35 mm. automatic-focussing enlarger, with " cold cathode " fluorescent illumination, by Messrs. M. C. and D. W. Jones, of Cardiff. An example of the ever-popular " M.E." cine-projector, to designs published in THE MODEL ENGINEER as far back as 1938, was entered by Mr. A. Debenham, of Battersea, S.W.11. A rather unusual exhibit was the map measuring device, capable of recording up to 100 miles, by Mr. R. Goudie, of Richmond, Surrey.

Junior Section

A widely varied selection of working and non-working models in this section bore evidence of the interest in craftsmanship to be found among the youth of today. It included another team effort, in this case a twin-cylinder double-



Mr. A. Debenham's "M.E." cine-projector



Roger Holden with his futuristic model rocket ship

acting marine engine entered by Cuckoo Lane Secondary School, having been carried out in one term by ten boys, eight of whom had only three months' tuition in metal work before starting on this project. Another engine was entered by Victor H. Ham, of Worthing, namely, a "Phoenix" 15 c.c. two-stroke, and other examples of mechanical work were a collection of hand tools and machine accessories by Bernard Lyons, of Hove, and a working model cannon to a scale of ½ in. to 1 ft. by Simon Green, of East Molesey.

Static models in this section included a free-lance waterline model of R.M.S. *Orion*, by Bernard Brooks, of Benfleet, an old English stage coach by Bernard Lyons, and a set of 12 buses in 4 mm. scale by P. Marshall Stone, of Hampstead.

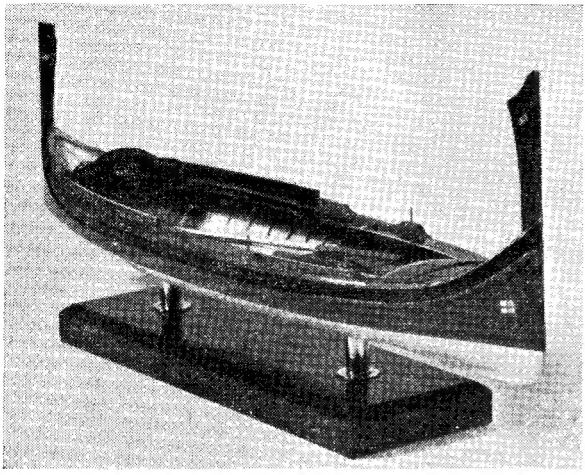
John H. Sweeting, of Whitecross, Hereford, exhibited a free-lance model racing car; Derek C. Coles, of Crediton, a police patrol launch, fitted with an E.D engine; and a futuristic subject was chosen by Roger D. C. Holden, of Burgess Hill, Sussex, who exhibited a rocket ship.

Marine Models

A number of interesting models from Scotland were exhibited this year, one being from Edinburgh, one from Arbroath, two from Tarbert, and a miniature from Bridge-of-Weir. The Edinburgh model was of the clipper *Thermopylae* by N. W. Wood. We remember Mr. Wood's model of a Stuart yacht in last year's Exhibition; this model has already won a prize in Aberdeen, where they ought to know something about the *Thermopylae*. The Arbroath model was by E. H. Floyd, of the R.N.A.S., and was of a Maltese dghaisa. Mr. Floyd gathered the information for making his model when in service at Malta. The photograph shows something of the quality of this model. The models from Tarbert in the wilds of Argyll, by Mr. G. MacKay Smith, were of a 16-gun brig, and the tea clipper *Thermopylae*, the latter being a miniature. Mr. MacKay Smith is a lone hand, but perhaps like many a lone worker, he has had to do his own research work, and thus his models have benefited.

Mr. M. H. Myers, of Worthing, sent a very fine model of a Zulu, and E. C. Freestone, of Greenford, a nice model of Captain Slocum's *Spray*. Both these models were certainly built to a very high standard. Mr. Freestone's model was inspired by the reading of Captain Slocum's book on his famous voyage round the world. I. W. Marsh, of Barry, well known for the very fine models he has sent to our Exhibition, entered a Bristol Channel pilot cutter this year. This was a smaller model than is usual for Mr. Marsh. There was a fine model of the spritsail barge *Will Everard* by M. J. Glandfield, of Richmond, Surrey.

From overseas came a model of the *Sea Witch* by D. D. Bilimoria Jnr., of Bombay, and a small model of a Baltimore clipper of 1820 by Emil G. Bai, of Elmshorn, Germany. T. W. Karran, of Harrow Weald, sent a model of a full rigged ship, *Manx King*, built from his early memories of the ship, together with a naval cutter of 1830. This builder's models



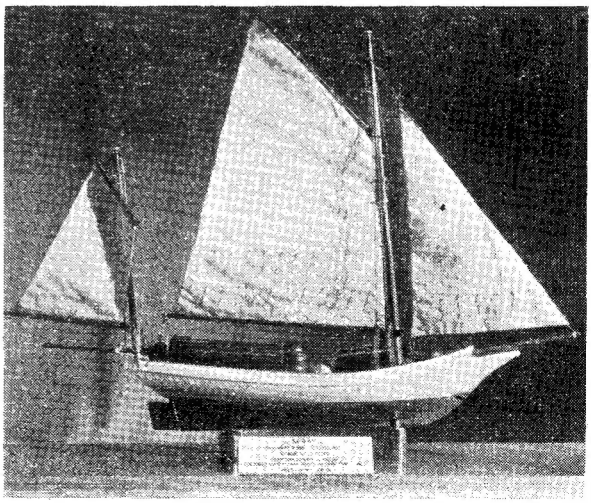
Mr. Floyd's interesting model of a Maltese Dghaisa

always contain interesting detail. There were two *Archibald Russells* and a third which was in the section for sailing models, and also a $\frac{1}{8}$ in. scale model of the clipper *Coriolanus* by R. E. Eastment, of Malton, Norwich. G. Hunt, of Greenford, Middlesex, sent in a model of the Kon Tiki raft. Considering the immense sale of the book on this raft, it is surprising that more models have not been made of her. There was a second example among the sailing models.

Class " G," the section for Sailing Yachts and Sailing Ships, attracted a good number of entries this year, which we consider is a very healthy sign. We like to see models which can be demonstrated in action in their natural element. Amongst the yachts there was a 36-in. " R " class and a Marblehead by Mr. J. E. Storey, of Clapton, E.5, both to Percival Marshall designs, and both with beautifully built hulls. There was also a Marblehead by Mr. C. V. Hooper, of Battersea, who is Publications Secretary of the Model Yachting Association. There was also a 10-rater by W. C. Morrison, of Southall. The cruising yachts by Colin Knapp and G. C. Mathews represented a type which is of considerable interest, and their appearance on the water is very attractive. The same may be said of the galleon *Golden Hind*, made jointly by R. Greenfield and H. Croucher, both of Birmingham. Incidentally, when a galleon is capable of sailing it is obvious that its general proportions are not far removed from those of the original. In this case the model was radio controlled, which we consider is the ideal method of control for a square-rigged model, especially as the control gear can be contained in the hull, and completely out of sight. We have seen photographs of this ship in action and are very much impressed. An interesting model is that of the Ceylon out-rigger canoe by W. O. B. Majer, secretary of the Wembley Ship Model Society. After trying this out at the Hove Regatta last July, Mr. Majer was fortunate enough to meet someone who was able to give him fully detailed information about the type, with the result that the model has since been made into a much more accurate representation. There were three square riggers, the 4-m. barque, *Flying Cloud* (not the American ship *Flying Cloud*) by K. Williams, of Hove, the *Archibald Russell* by P. Blanchot, of Grosvenor Road, and a three-mast barquentine by F. Pearson, of London. We saw Mr. Williams's model at Hove Regatta and were charmed with the picture she made running down the lake with all sails set. Incidentally, she figures in the cover picture for the September issue of *Model Ships and Power Boats*. A unique type of vessel is the Borneo cattle boat which has twin masts made from slender bamboo-like trees, with foliage left on to act as the sails. The model of this, by C. V. Thompson, of Hammersmith, attracted much attention. We are familiar with his sailing models of galleons, but this is a new departure.

There was a fair entry in Class " H," two hydroplanes, three speed boats, one of which is radio controlled, and an Air Sea Rescue Launch.

The Miniature Section, Class " I," was, as usual, one of the largest. Ladies seem to favour this section, no less than four entering models. These, with Mrs. Taylor's entry in Class " D," and Mrs. Watson's entry in Class " F," brought the ladies entries up to six, which is a record for the Exhibition. In three cases the wives of the exhibitors have taken up the hobby, which we think is the ideal solution of the ever-present problem of the " shipmodeller's widow." Donald and Mrs. McNarry each sent models. Mr. McNarry entered two models, one of a 40-gun



A model of the " Spray " in which Capt. Slocum made his famous voyage round the world

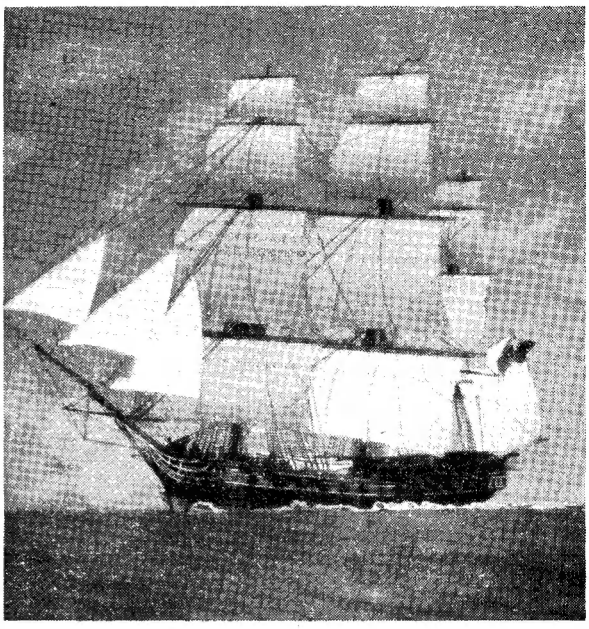
frigate and the other of the model trawler *Thorina*. The frigate was well up to his usual standard. It was interesting to see how he managed the intricate rigging at his usual scale of 1/50th = 1 ft. The model of *Thorina* looked very well and represents a very beautiful type of modern ship. Mrs. McNarry's model was of the paddle steamer *Comet*. We remember her exquisite model of the P.S. *Great Western* two years ago. Mrs. Val Montagu Fergusson, of Gerrards Cross, sent a 1-in. scale model of a Greek Caique. This is a type of vessel of which she has intimate knowledge, and we usually get from her an accurate and picturesque model.

Mrs. D. Chambers, of Rugby, entered a model of the 4-m. barque *Wanderer*, immortalised by Masefield, who at one time served on her. Mrs. Chambers showed us parts of this model a few years ago, before her marriage, and did a lot of good research work in getting information about the prototype. We understand that it is largely through her husband's influence that she has completed the model, which had to be laid aside for a time. He seems to have a proper appreciation of the value of a hobby, and also of his wife's talent for ship modelling. The remaining model, by a lady, was an 18th century cutter by Miss D. B. Kimber, who will be remembered for her model of the Kon Tiki raft in last year's Exhibition.

A notable entry was the group of naval open boats to ¼-in. scale by Mr. G. H. Draper, of Ilford. In recent years Mr. Draper has specialised in models of this type, and they were worthy of the closest scrutiny.

We were interested to see the plastic copy of an 80-gun bone model, by W. G. Gay, of Hayes, and also the model of the famous Clyde paddle steamer *Columba*, by C. Gray, of Bridge-of-Weir (Renfrewshire).

R. Carpenter, of Brighton, has exhibited many fine models in previous exhibitions, and this year his entry was of the cargo liner *Arakaka*, which, as will be seen from the photograph, is quite up to his usual standard.

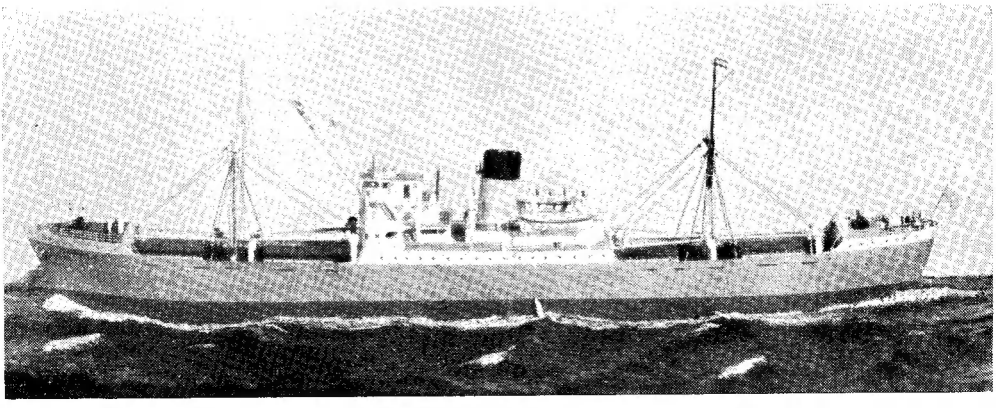


Mr. MacNarry's miniature model of a 40-gun frigate

An unusual bottle model was that of a galleon, sent in by L. Phillery, of Plumstead. In this the bottle is upright, and the sea on which the model sails fills the lower half. This raises anew the question of how it was put in the bottle.

There were two spritsail barges " on the mud," one of the *Martinent* discharging cargo, by A. S. Randall, of London, S.E.20, and the other showing the *Kathleen* in a creek, with the tide out, this being by F. W. Shipsides, of Portishead, nr. Bristol. It displayed effectively this modeller's talent with the realistic portraiture of a ship.

There was a miniature of the M.S. *English*



A realistic miniature of the cargo liner " Arakaka " by Mr. R. Carpenter

Star by J. L. Bowen, of Wanstead.

Before we leave the competition section, we must mention the aircraft carrier made by Michael F. Standen, of Epping. This has wonderful detail on its flight deck and was a very creditable model for a boy of 14.

There were many others we could mention, but we have said sufficient to indicate that the shiplover, whatever his tastes, was well catered for this year.

A new feature this year was the Celebrity stand on which were displayed cup-winning models from previous exhibitions. Among the marine models was Mr. Alderson's lovely clipper *Norman Court* (1947), Dr. Fletcher's river and coastal tug (1949) and Mr. A. T. Judd's little coaster *Eleftheria* (1951).

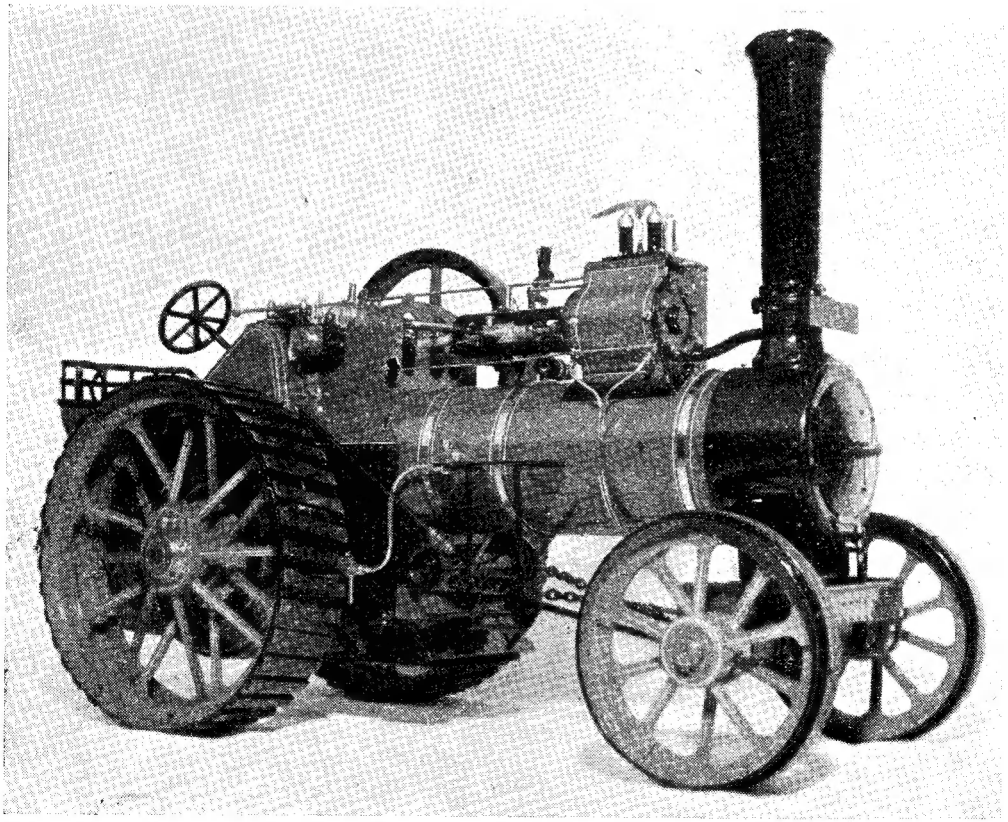
The loan models included a topsail schooner, by Norman A. Ough, a prisoner-of-war model of H.M. *Ceres* of 18-guns, loaned by Lt.-Cdr. Craine, I. W. Marsh's clipper *Sir Lancelot*, Mr. Charles Hampshire's tiny model of the *Golden Hind*, and to crown all, Dr. Longridge's magnificent model of H.M.S. *Victory*. The *Norman Court* was kindly lent by its present owners, Messrs. Baring Brothers, who used to charter the original ship when she was in the tea trade, and to whom we are deeply indebted for giving our visitors a further opportunity to inspect such an outstanding model. The *Victory* model was lent through the courtesy of the Science Museum, South Kensington, as a special tribute to its builder, who passed away a few months ago.

Traction Engines

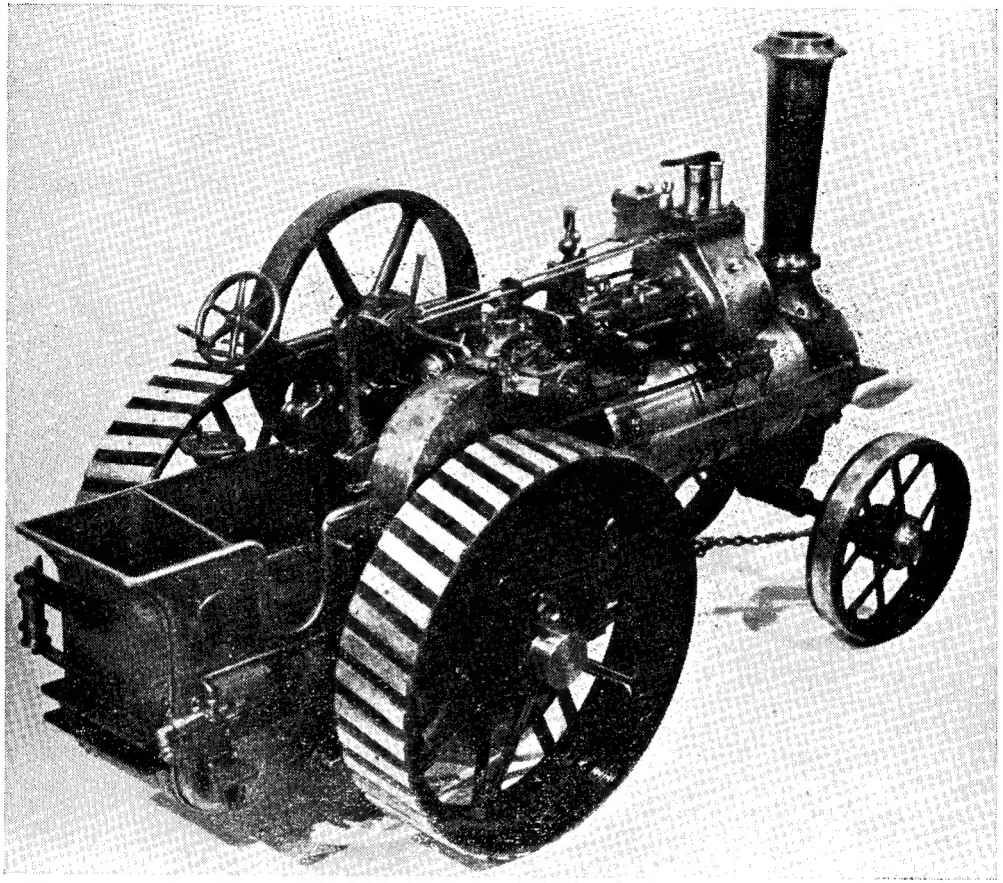
There were eleven model traction engines entered in the competition section, and most of them were of first-class quality. A 1½-in. scale engine based on the general arrangement of the Fowler A5 compound, built for South Africa, aroused interest, first because it was its builder's first model and, secondly, because it embodies one or two marked, but justifiable, departures from the prototype.

A 2-in. scale Marshall 7-n.h.p. tractor was described by its builder as " a strict scale replica ; all external details, including valve-gear, to scale ; coal fired ; will pull ¼ of a ton." Only the pressure-gauge and injector were purchased ; everything else, including patterns, nuts, bolts, etc., being home-made.

A 1-in. scale model of a Ransomes, Sims and Jefferies 6-n.h.p. showman's engine provided a



A strict 2-in. scale Marshall 7-n.h.p. traction engine



A 1½-in. scale Burrell "Devonshire" engine

rather unusual choice of prototype. It is the work of three enthusiasts who collaborated to produce an interesting model.

A general-purpose traction engine, built to 1-in. scale, was described as a representative model of a steam traction engine, *circa* 1906. It was a "first attempt" at so large a model by its builder, whose previous experience consisted of building a Stuart Turner No. 10 engine and some "OO"-gauge locomotives and stock.

We were pleased to note that the very interesting 1½-in. scale model Burrell engine which figured so prominently in the "M.E." for May 22nd last had been finished and painted; it attracted a lot of attention.

A 2-in. scale showman's road locomotive of original design was, curiously enough, another which is based on a prototype by Ransomes, Sims and Jefferies. It has hauled a load of 2 tons on the level, as well as several thousands of passengers, over a long period.

The well-known Burrell "Devonshire" engine, a light, single-crank compound, was represented this year by a 1½-in. scale model built as an attempt to produce a reasonably detailed and *working* model. It was built to drawings and castings supplied by the late A. J. Every, and its photograph shows it to be a very nice little job.

Another "first attempt" was a ¾-in. scale Burrell-type engine fired by methylated spirit. Its builder cut all the gears and the worm and pinion himself, using home-made cutters.

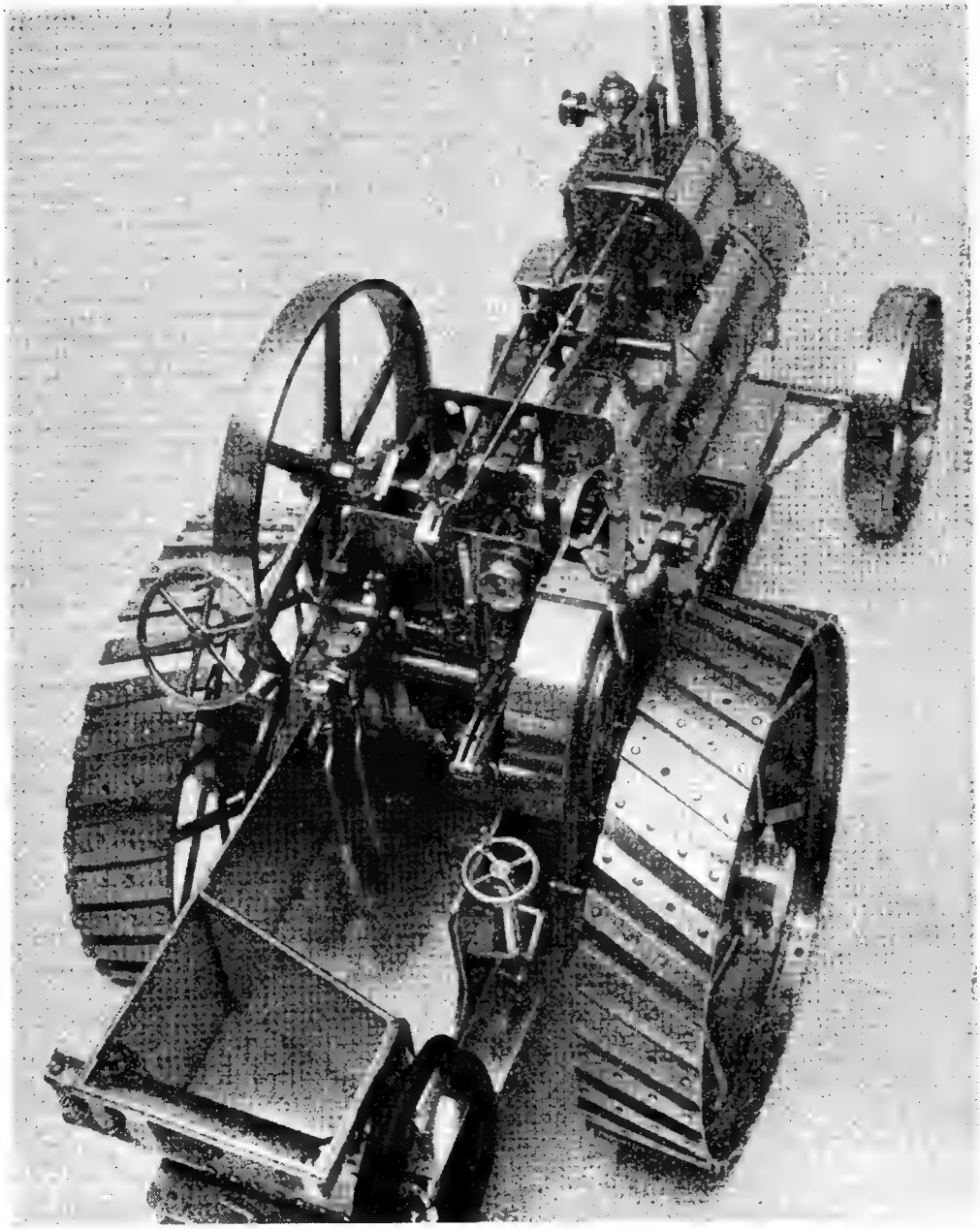
There was one example of the "M.E." 1-in. scale traction engine, which may fairly be claimed as "all my own work," by its builder, since the only purchased part was the pressure-gauge.

One more "first attempt" was described as a "free-lance" road locomotive with twin h.p. cylinders; not strictly to drawings. It is to 2-in. scale and its construction was begun five years ago. The builder, who is a fruit-grower (!), must possess more than average courage and determination; but he has been successful, the engine being steamed several times before finishing and painting a year ago.

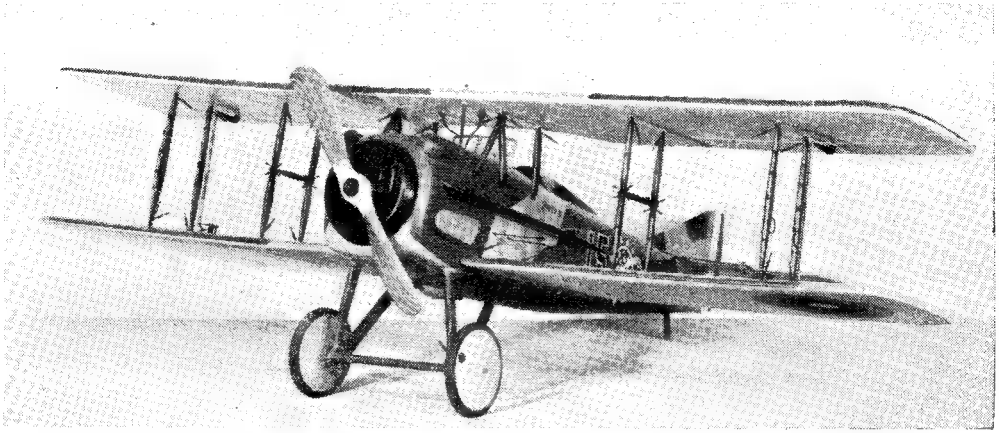
Model Aircraft

The models in this section formed a most attractive display which drew large crowds of Exhibition visitors. Model aircraft of all types from tiny 1/72nd scale "solid" models to large radio controlled entries of over 12 ft. wing span were exhibited.

As in recent years, the predominance of flying scale entries was again apparent. Strong contenders for the Club Team Championship in this section were the Polish Air Force Association M.A.C. who entered a very fine selection of models, the excellence of construction and finish of which was particularly noteworthy.



A nicely-finished 1½-in. scale Burrell single-cylinder traction engine



One of the entries in the Model Aircraft Competition Section, a 1/6th scale SPAD S-7 by F. J. Pithers, of London, W.11, which is powered by a 10 c.c. spark-ignition engine

On the Society of Model Aeronautical Engineers stand, which was situated on the dais, there was an interesting display of old aircraft models which contrasted with modern types, which included a rocket-propelled delta-winged model which is being developed by the Low Speed Aerodynamics Research Association. During his tour of the Exhibition, H.R.H. the Duke of Edinburgh showed great interest in this model. Also on the S.M.A.E. stand were trophies which had been won by British teams this year in international contests.

Visitors to the Royal Air Force stand were able to see models of aircraft made by prize-winners in the annual competition organised by the R.A.F. Model Aircraft Association. Many other models made by R.A.F. personnel were also shown on this stand.

Details of some of the outstanding model aircraft in the competition section will be given in a later issue.

Producing the Right Effect

One of the most interesting things about the model engineering hobby, as seen from our point of view, is the variety of ways in which different model makers produce successful and, sometimes, unsuccessful effects in their models, Perhaps, the marine model is the one that is most susceptible to injury, so far as its appearance is concerned, by incorrect proportions and faulty arrangements of visible details.

We have often thought over this matter, and our thoughts were revived recently by a fine model of ■ well-known liner that was taking part in a regatta. On the water, this model appeared to be ■ perfect replica of the prototype, and it won ■ lot of praise on that account. Out of the water, ■ close examination of it proved to be most interesting, for the construction was not remarkable for either the quality of the workmanship or the degree of finish put into it. The upperworks were almost crude and the ship's boats were found to be merely shaped and painted pieces of wood ! Obviously, this model, which was ■ sizeable one, some 6 ft. in length, had been planned and built as ■ *working* one, first and foremost ; the builder had spent little time, and may not have intended to spend much time on the actual work involved in making all the details.

Yet, he had produced ■ model that really did look like its prototype, and simply because everything on it that could be seen was correct in proportion and position. We recalled that methods of this kind usually fail miserably, due to the constructor, consciously or unconsciously, not matching his sense of proportion to the methods he is using. He may have neither the time nor the ability to produce a model in which the workmanship as well as the accuracy could be rated first-class. But any modeller can cultivate an eye for correct porportions, and it is much to his advantage that he should do so ; if more of it were done, we should see fewer grotesque reproductions of familiar prototypes. Good proportions are always satisfying, no matter whether the workmanship is of the highest class or crudest description.

We have seen examples of models in which the worksmanship was of the most faultless kind throughout, and yet the effect and, incidentally, the value of the model have been ruined because of hideous and unnecessary distortions of detail.

These comments may appear to have concerned ship models only but they apply with equal force to any type of model. At one time, locomotives were particularly prone to suffer from the " lack of proportion " blunderer, but there has been some considerable improvement lately, and we hope it will continue.

Model Power Boat News

End-of-Season Regattas

by "Meridian"

Mr. J. Rose (Coventry), assisted by Mr. Benson, starting "Meteor I"

WHEN the Grand Regatta has come and gone, the regatta season is almost over. Normally there are one or two fixtures after the Grand Regatta to wind up the season, and this year the final regattas were held during the month of September, on successive Sundays. These were organised by the Coventry, Kingsmere and Southend clubs respectively.

This year has been remarkable from the point of view of regatta inter-club attendances, and the large number of competitors at almost every fixture. Public interest, too, has been well maintained, in spite of somewhat poor weather conditions at many regattas. Relations with local governing bodies and councils have, in the main, been excellent, and co-operation and assistance has been forthcoming when holding regattas. The Kingsmere club, are, however, still without a water, and this year were refused permission even to hold one event on the Kingsmere Pond. It is to be hoped that this situation may be improved in the future.

Coventry Regatta

This was the first occasion that the organisers of this annual event have been able to obtain permission to hold it on a Sunday instead of Saturday. It was evident that this was a good move, by the excellent support given by a number of different clubs. Many thousands of spectators watched the various events with keen interest, and it was estimated that this was one of the biggest crowds ever seen at a regatta! An outstanding feature of the racing was the two-stroke versus four-stroke duel provided by the Class "B" boats, *Sparky II* by G. Lines, and *Meteor I* by J. Rose (Coventry); at the Southampton regatta this year, *Sparky II* was beaten, but this time emerged the winner with a speed of 60.16 m.p.h. against 57.98 m.p.h., by the four-stroke engined craft.

Mr. J. Slender (Welling) adopts a characteristic stance in starting "Sarah Ann" in the steering competition

G. Lines also won the Class "A" race with *Big Sparky* by a narrow margin from J. H. Benson's *Orthon*.

In the straight-running events, the difficult steering course shook the competitors, and the winning score was only 6 points out of a possible 15. G. Jones (Victoria), with *Fidelis*, was the successful competitor, with J. B. Skingley (Victoria) runner-up with the launch *Josephine*.

Results

Nomination Race

(1) V. E. Grey (Coventry), *Golden Eagle*: 3.2 per cent. error.

(2) J. B. Skingley (Victoria), *Josephine*: 4.75 per cent. error.

"*C*" *Restricted Race*

(1) S. Poyser (Victoria), *Rumpus* 3: 48.2 m.p.h.

(2) W. Morris (Bournville), *Rangi*: 41.07 m.p.h.

Class "C" Race

(1) H. Collier (Coventry), *CV6*: 39.33 m.p.h.

(2) C. Stanworth Sen. (Bournville), *May*: 38.76 m.p.h.

Class "B" Race

(1) G. Lines (Orpington), *Sparky* 2: 60.16 m.p.h.

(2) J. Rose (Coventry), *Meteor I*: 57.98 m.p.h.

Class "A" Race

(1) G. Lines (Orpington), *Big Sparky*: 51.91 m.p.h.

(2) J. Benson (Blackheath), *Orthon*: 51.39 m.p.h.

Steering Competition

(1) G. Jones (Victoria), *Fidelis*: 6 points.

(2) J. B. Skingley (Victoria), *Josephine*: 4 points.

Kingsmere Regatta

With the co-operation of the South London M.E.S., the Kingsmere regatta was held at Brockwell Park, London, S.W., instead of the originally planned Kingsmere lake on Putney Heath. In spite of the change, the number of competitors exceeded that of any Kingsmere regatta held in the past. Entries from Southampton, Swindon, St. Albans, Coventry and Cheltenham, in addition to the nearer clubs, all helped to swell the attendance and add to the success of the day's sport.

A heavy turn-out of prototype and other free-running craft contested the steering and nomination events, and in the case of the steering, the winner, J. Slender (Welling) with *Sarah Ann*, scored three bulls straight off the reel.

Winning speeds in the racing events were around the 60 m.p.h. mark in most of the different classes, an exception being the Class "B" race in which only one boat returned a time. *Sparky* 2 was damaged in this race, when a large chunk of the stern flew off while lapping at high speed, and this mishap caused *Sparky* to take no further part in the race. The winning boat was S. Poyser's *Rumpus* 4, the engine of which was made following the description of *Sparky* that appeared in these notes. Mr. Poyser has not had much luck so far with this boat, but keeps on experimenting, and has made some progress.

Results

Nomination Race

(1) Mr. Vosper (Southampton): nil error.

(2) J. Newton (S. London), *Slipstream*: 1.2 per cent. error.

(3) A. Newcombe (Victoria), *Skarlet Runner*: 4.4. per cent. error.

"*D*" *Class Race*

(1) K. Hyder (Victoria), *Slipper I*: 29.05 m.p.h.

"*C*" *Restricted Race*

(1) W. Everitt (Victoria), *Nan*: 63.13 m.p.h.

(2) C. Hancox (S. London) *Lady Joan*: 52.45 m.p.h.

(3) S. Poyser (Victoria), *Rumpus* 3: 46.49 m.p.h.

"*C*" *Class Race*

(1) R. Phillips (S. London), *Foz* 2: 58.78 m.p.h.

(2) B. Miles (Kingsmere), *Dragonfly* 3: 50.13 m.p.h.

(3) H. Collier (Coventry) *CV6*: 45.5 m.p.h.

"*B*" *Class Race*

(1) S. Poyser (Victoria), *Rumpus* 4: 36.53 m.p.h.

"*A*" *Class Race*

(1) E. Clark (Victoria), *Gordon* 2: 61.61 m.p.h.

(2) J. Innocent (Victoria), *Betty*: 53.83 m.p.h.

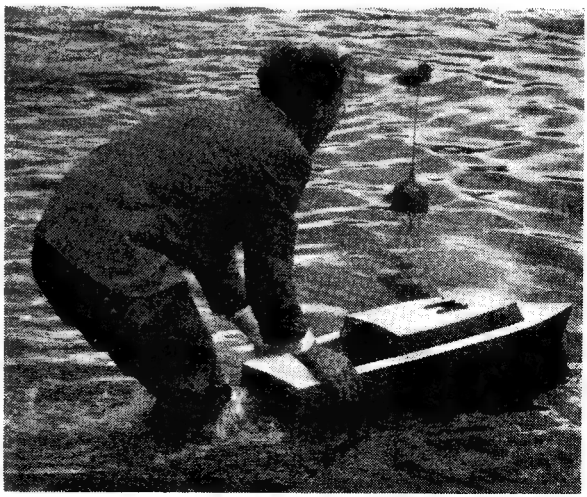
(3) G. Lines (Orpington), *Big Sparky*: 52.45 m.p.h.

Steering Competition

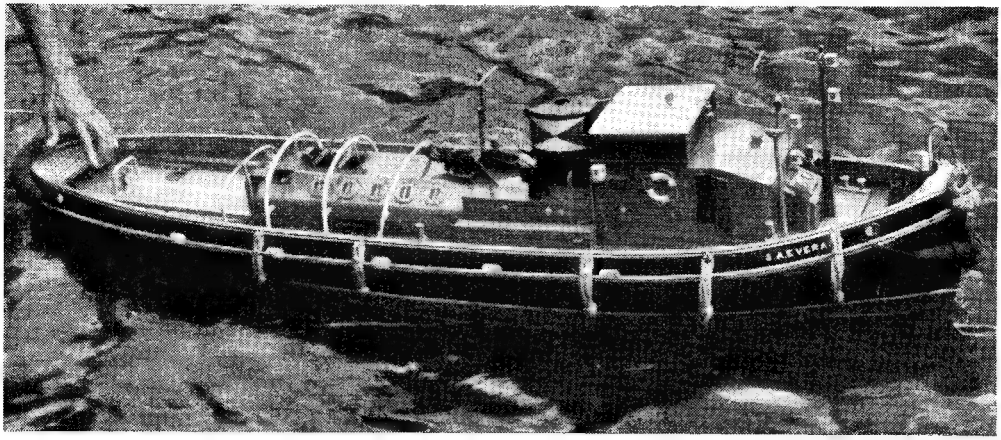
(1) J. Slender (Welling), *Sarah Ann*: 15 points.

(2) A. Squire (Kingsmere), *Comet III*: 11 + 5 + 5.

(3) C. Morgan (Kingsmere), *Yama*: 11 + 5 + 3.



Mr. J. H. Benson (Blackheath) with "Comet"



Mr. R. Brown's petrol-driven tug "S.A. Everard" (Victoria)

Southend Regatta

The first M.P.B.A. regatta of the Southend M.P.B.C. was held recently at Southchurch Park, Southend-on-Sea. Events were for free-running and radio-control boats only, but it is hoped that speed events may be included at future regattas.

The lake used is a salt water one, and steam exponents had to be careful to see that feed pumps were disconnected!

A number of competitors came along from several London clubs to support the regatta, but the home club held their own very well. Three out of four events were won by Southend members, and one second place was obtained.

A novelty was the long steering event over a course of 200 yd. (one run only), and the winner was J. Chandler's *Iope*, a neat launch that has appeared in many regattas and registered quite a few wins. The radio-control event was won by the model paddel steamer *Medway Queen*, owned by R. Salmon, which scored 32 points out of a possible 40. In the steering competition, the battleship *King George V*, by H. Dowling (Southend), was the winner with 13 points—two bulls and one inner.

The London clubs represented at the regatta included: Blackheath, Victoria, Welling, N. London, Orpington and W. London.

Results

75 yard Nomination Race

(1) A. Rayman (Blackheath), *Yvette*: .79 per cent. error.

(2) W. Blaney (Victoria), *Lil' Man*: 6.5 per cent. error.

(3) R. Brown (Victoria), *S. A. Everard*: 7.3 per cent. error.

Steering

(1) H. Dowling (Southend), *King George V*: 13 points.

(2) J. Chandler (Southend), *Iope*: 11 + 5 points.

(3) J. Slender (Welling), *Sarah Ann*: 11 + 3 points.

Radio Control

(1) R. Salmon (Southend), *Medway Queen.*

Long Steering

(1) J. Chandler (Southend), *Iope*

(2) W. Phillips (Victoria), *Kenvera.*

(3) J. Skingley (Victoria), *Josephine.*

The Flash Steamer "Frolic"

B. J. Pilliner writes:—"I am pleased to see the comments in the editorial of a recent issue, although I am told that some of my friends have shuddered on first viewing the cover. However, I would like to correct the wrong impression you have regarding the reason for the flywheel position. Early in the year, with the flywheel in the centre, the boat was 'flipping' at approximately 70 m.p.h. at Southampton. On choppy water elsewhere it rode very badly at a much slower speed. The flywheel and plant were moved to the nearside and the tethering position raised to pull the boat up on the nearside corners of the planes. It was hoped to spill the air lift, and also, by decreasing the planing surface when running, improve the stability. After two or three months this layout was abandoned, as increased planing resistance held the maximum speed to the fifties, and a tendency of the nose to head in towards the pole, (which it was found difficult to correct), actually lowered the 'flip' speed considerably. Moving the flywheel and thrust to the nearside *increased* the tendency to yaw on starting, which had to be counteracted by a fin under the offside rear of the boat. This fin was lifted out of the water as the speed increased. Incidentally, since returning the flywheel to the centre position, the previous performance has not been reached again.

"The aerofoil is a 'makeshift' to stabilise the hull at higher speeds than were anticipated when it was designed."

The Allchin "M.E." Traction Engine

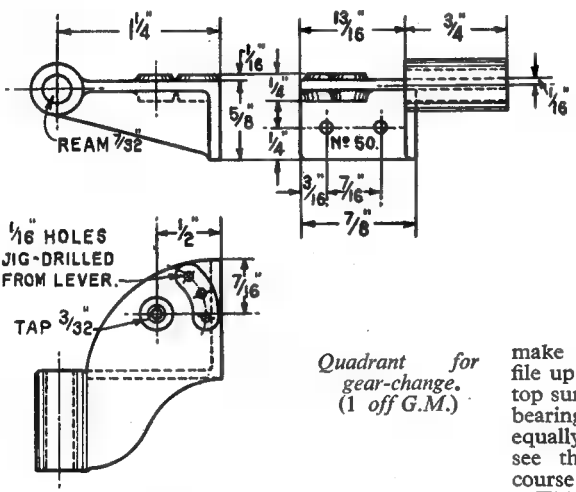
to 1½-in. Scale

by W. J. Hughes

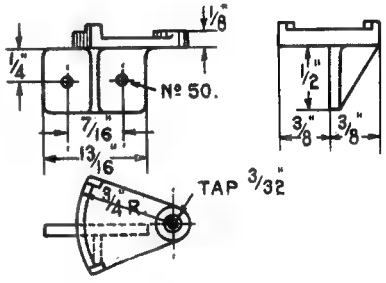
THERE are several small bits and pieces which had better be described now, or they might be forgotten later!

However, first let me make *quite* clear the paragraph published last time about the error concerning the spectacle plate! The fact is that the drawing of this, published in the July 10th issue, and on Sheet 2 of the blueprints, is *quite* correct except for the dimension only, which reads "1¾-in. rad." instead of "1⅞-in. rad.", as it should. In other words, the curve itself is *drawn* to the correct radius, as can be checked from the blueprint.

So if you are working to the latter, and if you have the wise habit of checking the given figures with the drawing itself, as you should, you would notice the error straight away. In any case, please note that if you originally set out to 1¾ in., it is important when correcting *not* to file the hollow out to more than ½-in. deep in the middle.



Quadrant for gear-change. (1 *off G.M.*)



Regulator quadrant (1 *off G.M.*)

The Gear-change Quadrant

If you look at Photograph No. 10 (August 7th issue), you will see the quadrant-shaped casting which carries the gear-change lever, shaft, and fork. The lever itself pivots on a pin screwed into the casting, with a lock-nut underneath, and its end engages a pin set in the cross-shaft which carries the fork *F*.

This shaft slides in a long bearing formed in the quadrant, and the lever may be locked in any of three positions—fast speed, neutral, or slow speed—by means of a pin passing through it into one of three suitable holes drilled in the quadrant. The quadrant is cast with a vertical back-plate for bolting to the front-plate—sorry if that sounds a bit mixed-up, but it is right!—and a vertical web is cast underneath the quadrant to stiffen the whole thing.

A. J. Reeves supplies a very neat little casting for this quadrant, which needs only cleaning up to make it correct. It is necessary, however, to file up the backplate, keeping it square with the top surface, until it is 1¼-in. away from the shaft-bearing centre-line, and parallel with it. It is equally important when drilling this hole to see that it is parallel with the backplate, of course!

This can be done by clipping the backplate to an angle-plate set on the drilling-table. It should then be possible to adjust the position of the casting until the bearing comes square *both ways* with the table. Incidentally, use a small centre-drill first: then a ⅛-in. drill, and follow up with the reaming-size for 7/32-in. But if you haven't a 7/32-in. reamer, don't worry—just put through the 13/64-in. drill, and follow up carefully with the 7/32-in.

The hole for the pivot-pin can be tapped either 7 B.A. or 3/32 in., but the three holes for the locking-pin should *not* be drilled for some time yet—in fact, not until the whole gear-change is assembled! Nor should the two No. 50 holes in the backplate be drilled yet.

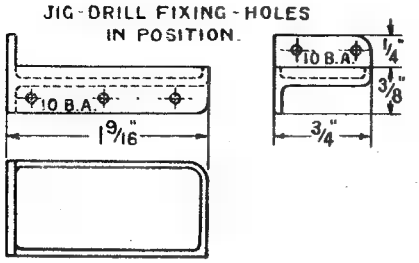
Regulator Quadrant

In the same photograph may be seen, but not very clearly, the regulator quadrant. It makes quite a pretty little casting, which again needs little more than cleaning up. The hole for the pivot-screw may be tapped 7 B.A. or 3/32 in., but with the regulator quadrant we may leave the two fixing-holes until later.

Continued from page 456, "M.E.," October 2, 1952.

Tool Tray

It would not be a difficult matter to build up or fabricate the tool-tray from brass sheet, but the casting is available for those who want it. When cleaning it up, great care must be taken to keep

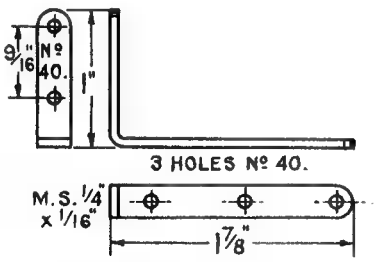


Tool tray

the two bolting-flanges not only flat, but square with each other, since they are bolted to the front-plate and hornplate respectively.

To fit it in place, first remove the front-plate, and clamp the tool-tray to it in its correct position, as shown in the drawing of the front-plate (July 10th). "Spot" the holes through with a No. 50 drill, then remove the tray and complete the drilling with a No. 55 drill. Tap 10 B.A. and fix the tray back in position with two temporary 10 B.A. screws.

Now replace the front-plate, and the side-flange of the tool-tray should appear in its correct position. Use a toolmaker's clamp to support it—the 10 B.A. screws will help, of course—and "spot" the three No. 50 fixing-holes through those in the hornplate. Then, without removing the tray, or even the clamp, drill the holes right through (No. 55), and tap 10 B.A., when three more temporary screws may be inserted. In *final* assembly, hexagon-head screws will be used, with lock-nuts on the inside.

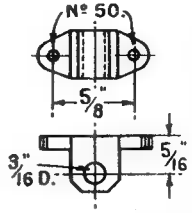


Rear bracket for footboard

Footboard Bracket

Another small fitting is the bracket for the footboard, which fits to the right-hand hornplate. There will be another to make later, but that is fitted on the smokebox and can wait.

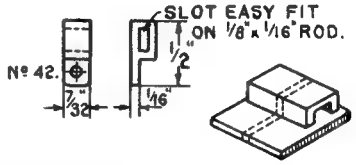
The bracket is simply a piece of flat mild-steel of $\frac{1}{4}$ in. × $\frac{1}{16}$ in. section, bent at right-angles and with the ends rounded. Tip: if you use *bright* mild-steel it may be necessary to anneal it before bending—depends how much rolling it has had—you will get a crack on the corner. Set out and drill the five No. 40 holes, and that is that. Its position is shown on the drawing of the right-hand hornplate (June 12th), and in final assembly use hex.-headed 7-B.A. or 3/32-in. screws, with lock-nuts inside.



Steering shaft bracket

Steering-wheel Shaft Bracket

The bracket for the steering-wheel shaft may be made from a small casting, or cut from a piece of solid metal of $\frac{3}{8}$ in. × $\frac{7}{16}$ in. section. Gunmetal or phosphor-bronze would be better as a bearing for the steel shaft than would steel or ordinary "screw-rod" brass. The making is quite straightforward and needs no detailing, I imagine, but when the No. 50 fixing-holes are drilled it



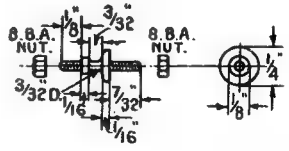
Bracket for draincock-rod (2 *off*), *and method of making*

would be advisable to leave the drilling of the corresponding holes in the hornplate until the steering-gear is ready for assembly.

Draincock-Rod Brackets

To open the cylinder drain-cocks from the footplate, a rod is fitted in two small brackets on the right-hand hornplate, and extends forwards to the cocks.

To make the brackets, you can take a scrap of



Bracket for damper-rod (1 *off M.S.*)

$\frac{1}{8}$ in. thick by 9/32-in. wide steel, about $\frac{1}{2}$ in. long. Stick it in the vice, and file out a groove lengthways, slightly more than $\frac{1}{16}$ in. deep and slightly wider than $\frac{1}{8}$ in.—in other words, an easy fit for the $\frac{1}{8}$ in. × $\frac{1}{16}$ in. rod which is to be used to open the cocks.

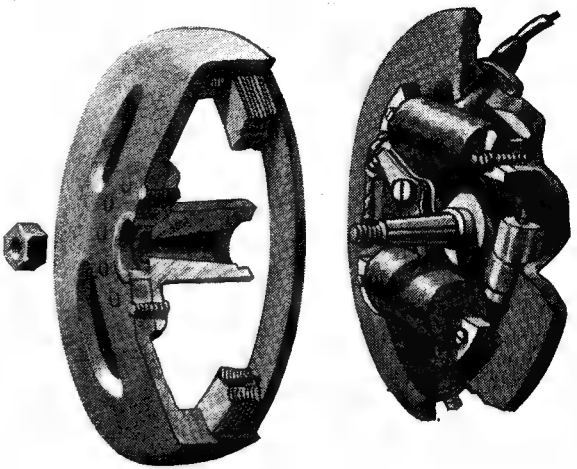
When the groove is finished, place the metal on a scrap of $\frac{1}{16}$ in. plate (as sketched)—both well cleaned, of course—wire in place, and anoint

(*Continued on page* 579)

A Magneto for the "Busy Bee"

An entirely new design for a flywheel magneto-generator, suitable for all types of small power engines

by Edgar T. Westbury



Exploded part-sectional view of the "Busy Bee" magneto

THE fully detailed constructional description of a magneto, of a type and size suitable for autocycle or motor-assisted cycle engines, has never, so far as I am aware, been previously published in any journal, and in this respect it may be claimed that the design I am now offering represents a pioneer effort. There are several unique problems both in the design and production of such a highly specialised device, involving as it does both mechanical and electrical engineering, but lest readers should consider this work beyond their scope, I would assure them that, given a sound design, any reasonably competent model engineer will be able to carry it out quite successfully.

Since I first mentioned that I was working on an experimental magneto for the "Busy Bee," I have had many requests from readers to hurry up and describe it; and despite my statement a few weeks ago that there were difficulties, at present without a practical solution, in the supply of suitable magnets for a magneto of this type, the demand still continues. It has occurred to me that if a description of the magneto is published, someone who sees it may be in a position to help out with this particular problem, which in any case is only temporary, as I feel confident that the time is not far distant when manufacturers of raw materials will be glad to supply them to customers, however large or small the orders. For the rest, there are no problems beyond the scope of the home workshop and the ingenuity of the model engineer.

The present design is one of several which have been tried out quite successfully, and it has been selected for recommendation to constructors for several reasons, including not only facility for home constructors, but also avoiding any clashes with existing commercial designs, many of which are the subject of patents. I have myself been the victim of "patent piracy" on more than one occasion, and regard it as a very mean kind of dishonesty, for which the only possible (and not very certain) remedy is expensive litigation; for this reason I am very scrupulous in avoiding it in my own designs and research work, so far as is humanly possible.

Magnetic Materials

While this magneto involves no new functional principles, however, it can still be claimed as an entirely original design, as it is not a copy of any existing type, and the arrangement of its details is designed to promote simple construction and accessibility for adjustment. It is not the smallest magneto which could be devised for work of this particular nature, as ample margins of reliability have been allowed on all essential parts; and a feature which has been given particular attention is economy in the special, and relatively expensive, magnet steel employed in it. The use of one of the most efficient commercial magnet steels is fully justified, because although it would be quite practicable to employ a much less efficient steel in a similar magnet system, it would inevitably make the assembly larger in diameter and the actual magnets would have to be greater in length, so that no real economy would be effected. One of the features of modern high-efficiency magnets is that they can be made very short, as the cross-sectional area is the important factor, and thus the quantity of active magnet material is very small compared to older types of magnets, which had to be made in horse-shoe or semi-circular form to concentrate the flux across the poles. (I have made quite good magnetos with low-efficiency magnets, including the original "Atom" magneto, which has been described in the "M.E.," and also in my book *Ignition Equipment*; but reference to this design will show that it involves the need for a totally different, and inherently more cumbersome, design of the magnetic circuit; besides which, the magnets are more liable to risk of demagnetisation, precautions against which must be taken in the design.)

The rest of the magnetic circuit consists of ordinary soft iron or annealed mild-steel in the

form of laminations. Special magnetic iron or alloy is not necessary, and in the ignition element at least, has not been found advantageous; some of the modern transformer alloys would be definitely unsuitable. In the design of the stator, the quantity of iron is kept down to the minimum, as it is an axiom in magneto design that to make the most effective use of limited flux, the less iron which is subjected to alternating polarity the better. (I make my apologies to electrical experts for this crude and imperfect expression of involved electro-magnetic theories!)

A Dual-purpose Generator

Most of the popular types of magnetos used on small engines are designed to perform a single function only—the production of the high-tension spark. This applies not only to the separate unit magnetos which are driven by gear or chain from the engine, but also flywheel and other built-in magnetos. But the need for a supply of electric current for lighting and other purposes is felt, even on the humblest motor-propelled vehicles, and the possibility of utilising the magneto to produce both high- and low-tension current is often exploited. One of the earliest examples of a dual-purpose magneto-generator was the Villiers flywheel magneto, in its original two-pole form; it may be said that in the flywheel type of magneto, there is the best possible scope for adding a second electrical unit, as it may often be fitted into space which would otherwise be wasted, with very little increase in the weight or complication of the complete unit. On the very smallest types of flywheel magnetos, however, it is common to employ an unsymmetrical type of rotary magnet system, which is highly efficient for producing a single spark per revolution, but unsuitable for generating a steady continuous current. (Incidentally, I may mention that I spent quite a lot of time once in attempting to add a low-tension generator to such a magneto without increasing its size or making other drastic alterations in design; the results were only partially satisfactory, and it was found more desirable to redesign the magneto completely.)

In the present design, a symmetrical four-pole magnet system is employed, which not only favours smooth current generation, but is equally efficient for producing an ignition spark, particularly at low or medium speeds. It will be clear that, compared with a symmetrical two-pole system, the polarity of the stator poles changes twice as rapidly for a given rotor speed. Thus an effective spark is produced at quite a low engine speed, and in the low-tension supply, the fluctuation of voltage is less noticeable, so that when used for direct lighting (as is usual), flickering at low speed is avoided. It is generally agreed that two-pole lighting generators are at a disadvantage in this respect, unless driven at higher speeds than the minimum working speed of the engine.

I have not considered it necessary to give a detailed explanation of the working of this magneto, as it differs in no essential respect from that of any other flywheel magneto, and indeed it may be said that all ignition magnetos follow exactly the same principles, despite wide variation in the form and arrangement of their working parts. Anyone wishing to obtain a full description of ignition spark generators of all types may find it in the handbook *Ignition Equipment* previously mentioned, which is obtainable from the "M.E." Publishing Department. I will, however, proceed to describe the various parts of the magneto, and their functions.

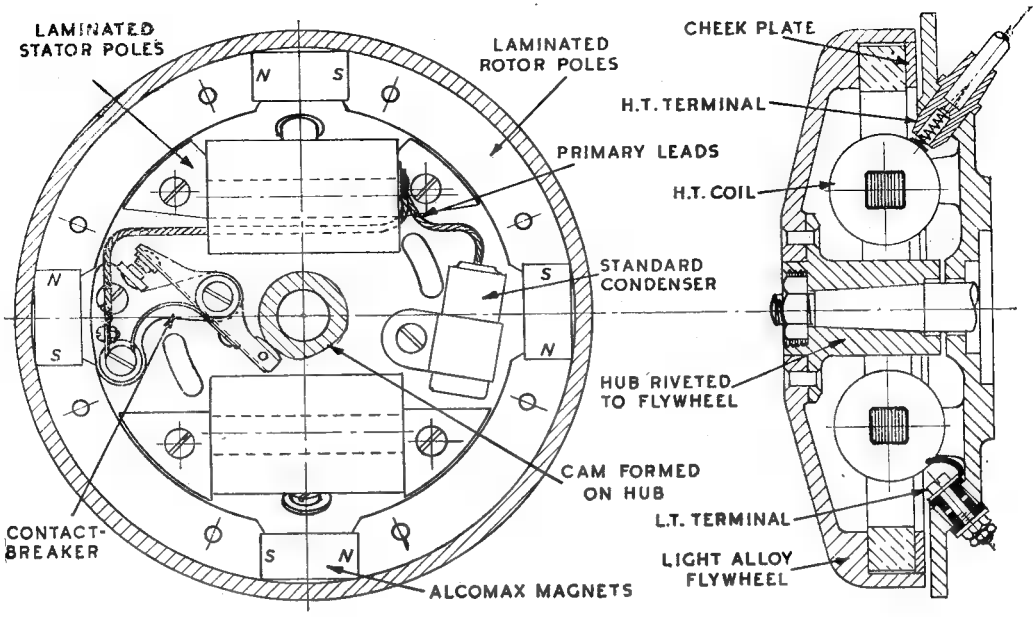
Flywheel Assembly

The rotating portion of the magneto is mounted on the engine shaft, and comprises a steel hub, to which is attached a dished flywheel of non-ferrous metal, the rim of which houses the complete magnetic system. This in its turn embodies the four short bar magnets with their laminated pole shoes, held in place by means of screws passing through an outer cheek plate, and tapped into the thick part of the flywheel rim. The magnets are arranged to produce alternate N and S salient poles in the pole shoes. It is, of course, highly important that the flywheel and cheek plate should be of non-magnetic material, otherwise the magnets would be short-circuited, and would fail to produce the necessary concentration of flux at the pole shoes. Aluminium alloy is specified for these parts, as although bronze or gunmetal would be equal or superior in mechanical strength, its weight would be a good deal greater; and while plenty of rotating weight in a flywheel is desirable, it tends to retard any change of engine speed, which makes it less sensitive in responding to controls.

The steel hub has a cam formed on the end of the external surface, which operates the rocker arm of the contact-breaker, and is timed to break the circuit at the moment the pole shoes of the rotary magnet are in the appropriate juxtaposition to the stator poles. This relationship is quite independent of the timing of the spark relative to the position of the engine piston; any change in the latter respect has no effect on the electrical efficiency of the magneto. As the magnet system has four poles, it would be possible to obtain four sparks per revolution, simply by using a four-lobed contact-breaker cam; but this is, of course, neither necessary nor desirable in a single-cylinder engine. The four poles are, however, all usefully employed in generating low-tension current.

Stator Assembly

All the electrical components are mounted on a light alloy backplate, which is designed to be attached to the standard mounting plate, as specified in the engine drawings, by means of two studs or set screws, through slotted holes which allow of a limited amount of angular adjustment to advance or retard the spark timing. Four pillar bosses are provided on the backplate, to support two complete exciting coil assemblies with their laminated cores and pole shoes. The upper of these two assemblies is the ignition unit, which has both primary and secondary windings, the latter being heavily insulated, and its outer end terminating in a tag on the outside of the coil, making contact with the H.T. terminal by means of a spring. Both the inner end of the secondary and the outer end of the primary have a common con-



General arrangement of magneto. (*Half full size*)

nection to the " live " sides of the contact-breaker and the condenser, while the inner end of the primary is " earthed " to its core or the backplate. These connections are normal to any type of ignition magneto, and are the simplest it is possible to devise.

The lower coil assembly is the generator unit, which is provided with a single winding, one end of which is earthed, and the other connected directly to an insulated terminal screw in the backplate. Neither the coil insulation, nor that of the terminal, present any problems, as they have only to cope with low-tension current. It will be seen that the pole shoes of this unit have a greater angular length than those of the ignition unit, the object being to smooth out the alternating flux, and produce as nearly as possible a " sinusoidal " wave form, whereas in the case of the ignition coil, efficiency demands a more abrupt change, or in other words, a " peaky " wave form.

The ignition contact-breaker, although not identical in form with any standard type, works on normal principles, and calls for no special explanation. Two different types of breaker assemblies have been designed for this magneto, the second (not illustrated) being of the spring blade type. Both work quite satisfactorily, but the type shown is more in keeping with orthodox practice, and seems to be preferred by most people with whom the design has been discussed.

(*To be continued*)

The Allchin " M.E." Traction Engine

(*Continued from page 576*)

with " Easyflo " flux. Heat to dull red, and apply the tiniest amount of " Easyflo " to each joint, so as not to have any run into the slot.

Allow to cool, and clean up. Cut in two as indicated by the dotted lines, and finish-file to size. If necessary, clean out the slots with a needle-file. These brackets fit outside the horn-plates, with the slots uppermost, and will eventually be fitted with 8-B.A. hex.-headed screws and lock-nuts.

Damper-rod Bracket

A simple turning job finishes this week's list, being the bracket for the damper-rod. Probably the best way to turn it is to grip a stub of $\frac{1}{4}$ in. dia. mild-steel rod in the chuck, leaving about $\frac{3}{4}$ in. or so protruding. First turn the 7/32 in. long spigot and screw it B.A., rough-turn the rest of the job to size, and part off.

Next, chuck short end of brass rod, face and centre the end, tapping it B.A.

Screw the bracket into the screw-chuck you have just made, finish it off to the dimensions given in the drawing, and that is all for the present!

(*To be continued*)

"Britannia" in 3½-in. Gauge

by "L.B.S.C."

Boiler Backhead

THE boiler backhead was illustrated in September 11th issue, at the bottom of page 341. It is the same shape as the throatplate, and therefore can be flanged over the same former (thank goodness, says you!) but is not so deep, owing to the slope at the bottom of the firebox. Lay the former on a sheet of ⅛ in. (10-gauge) sheet copper, and scribe a line around it, about $\frac{5}{16}$ in. away from the top and sides, but leave it 1 in. shorter at the bottom. My favourite trick is to scribe a deep scratch across the former, near the bottom, at backhead length from the top; this is laid on the copper sheet, with the line corresponding to the edge of the sheet. Then all I do, is to mark the outline above it, the correct distance from the edge of the former, and cut out the piece. When flanged, the backhead is the correct depth from top to bottom. Flange up the plate over the former, in the same manner as the throatplate was flanged, and don't forget to anneal it immediately the flange shows signs of "going hard."

The backhead is set out at the bottom, to match the backward slope of the firebox wrapper sheet; so at 1⅛ in. from the top, make a couple of sawcuts in the flange. This will enable the backhead to be bent outwards at this point quite easily, for a distance of 1⅛ in., as shown in the side view in the illustration. It doesn't matter a bean about the sawcuts opening out, as the brazing will fill up any interstices and there will be no chance of leakage. Anneal the backhead before bending; afterwards, file off any ragged edges, and clean up the flange with a rough file. The more it is scratched, the better the brazing holds.

How to Fit the Backhead

First cut the hole for the firehole ring. To get the correct location, measure from the top of the wrapper to the ring, on the boiler thus far assembled; also from each side, to the ring. Transfer these measurements to the backhead, mark out a rough oval within their limits, and cut out the piece, same as the hole was cut in the firebox door plate; but leave it on the small side. Now "offer up" the backhead to the boiler shell, holding it in position; and mark around the hole, the places where it will need filing, to allow the flange of the firehole ring to go through the hole. After filing to size, put the backhead in place, with the flange of the ring through the hole—don't forget to clean the inside edge of the wrapper sheet—and hammer down the projecting bit of flange outwards, until the backhead is tightly gripped between flanged part and shoulder. Rest the inner side of the ring on a bit of bar held in the vice, standing out from the side of the jaws, while doing this job. This type of firehole makes a far better job than the old solid ring placed between the two plates and riveted through; and is the next best thing to full-size practice, in which the holes in both firebox and backhead are flanged in a hydraulic press, and fit one within the other when erected. This *could* be done by hand, but it would be a ticklish job to get the proper fit.

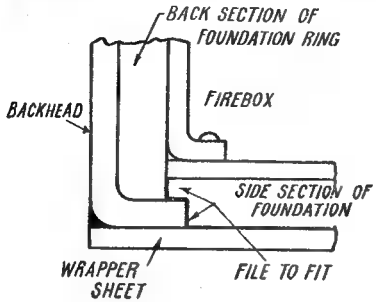
Now tap the edge of the wrapper into close contact with the backhead flange. Owing to its size, it won't stay in contact of its own free will and accord, whilst the brazing is being done. To teach it good manners, drill a series of No. 48 holes all around, right through wrapper sheet and backhead flange, at about ¾ in. centres. See that the metal is in close contact at each hole, as you run a 3/32-in. or 7-B.A. tap through both thicknesses; then put ¼ in. of corresponding thread on the end of a bit of 3/32-in. copper wire, screw right home, and snip off close to wrapper. Ditto repeato until all the holes are served likewise; but before screwing in the wire, make absolutely certain that the wrapper sheet is hard up against the backhead flange. If there are any slight gaps between the studs, judicious use of a hammer will close them up; the wrapper should then be in close contact with the flange, all the way around, and it should "stay put" while being brazed. No holes are drilled for fittings until after the boiler is tested.

Foundation Ring

The spaces between the wrapper and firebox, and between firebox and backhead, are filled up with pieces of ¼ in. square soft copper rod; this is easier to fit, and is just as satisfactory as the regulation type of foundation ring. The back piece is fitted in exactly the same way as the piece at the bottom of the throatplate. Clean it, bevel the edges, and jam it tightly between the backhead flanges; if the firebox door sheet doesn't make contact with it for full length, stand the boiler on end, backhead downwards, and gently hammer it down. Drill No. 41 holes all the way along, between the ends, at about ½ in. centres, right through backhead, rod, and door sheet, and rivet up with 3/32-in. round-head copper rivets about ⅝ in. long, heads inside the firebox. Don't bother about fancy heads outside; they can be filed flush after brazing—unless, of course, you are a lover of little pimples!

The spaces at the side, are treated to a dose of the same medicine. It is advisable to sink the pieces of rod about $\frac{1}{16}$ in. in, as this gives a channel for the brazing material to flow into, and makes the job easier, as you can fill the channel up completely if you so desire, totally eliminating

any chance of leakage. I once tried, as an experiment, using a strip of sheet copper, bent into a channel like a rainwater gutter, putting it in with the concave side down, and filling up the whole issue with Sifbronze. I shall have put in a considerable mileage driving the *Astral Belle* (calling at Mars and Venus on Saturdays only) before that ring ever thinks about shedding a



How to fit corners of foundation ring

tear! When fitting the pieces of copper rod, file the ends to fit the corner joints. It is a million dollars to a pinch of snuff that the corners will be like the reproduced sketch, so take precautions. If the boiler is being brazed, it would be advisable to drive little splinters of copper into any gaps; otherwise, the melted brazing strip may run through, and form stalactites inside the boiler. If you are one of those lucky merchants who own, or have the use of an oxy-acetylene or oxy-coal blowpipe, and are using Sifbronze, it doesn't matter. The Sifbronze will stop up all interstices. The advertisement "Sifbronze is darn good stuff," is true enough. I've no shares in the firm, but I've used it ever since first trying it—'nuff sed!

Bushes

The sizes and location of the bushes are shown in the general arrangement of the boiler recently published. I always use copper for the bushes on my own boilers, as there is no risk of melting, as with brass; but good quality bronze will be quite O.K. Gunmetal will also stand silver-soldering without suffering any ill-effects. All the bushes are merely plain turning jobs, and need no detailing out. Maybe our advertisers will come up to scratch with short lengths of thick-walled copper tube, such as I use myself for smaller bushes. If I have not got a piece large enough for a dome bush, I make it from a piece of heavy copper plate. The last one I made was the same size as *Britannia's*. I sawed out a piece of $\frac{5}{16}$-in. copper 2 in. square; chucked it truly in four-jaw, centred, drilled, and finally bored a hole in it to $1\frac{3}{8}$ in. finished diameter. This was then chucked on the appropriate steps of the inside jaws of a self-centring chuck, the corners turned off, and the diameter reduced to $1\frac{3}{8}$ in., after which, the step was turned, and there was a perfect bush. Simple enough, sure-lie, as they say in rural Sussex.

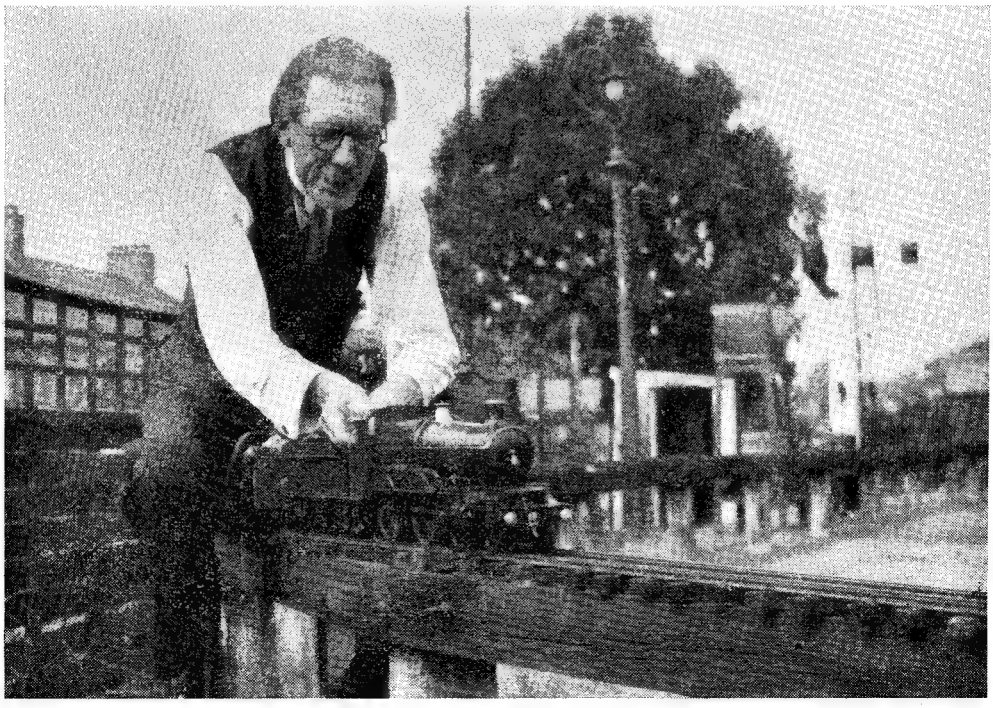
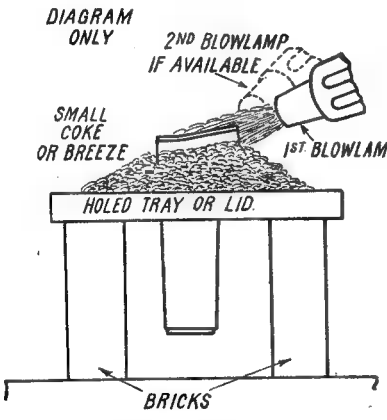


Photo by] ["*Bro. Sparrow*"

A spot of enjoyment—by our Technical Editor

The safety-valve bushes are turned from $\frac{5}{8}$ in. thick copper tube, or bronze or copper rod, and tapped $\frac{3}{8}$ in. × 26. Now beginners often tell me a tale of woe, as to how their drills either seize up and break when drilling drawn phosphor-bronze, or else they get hot, and lose their temper, becoming cantankerous like a human being who does ditto. Well, that trouble is easy enough to overcome. I keep a few special drills for drilling that kind of bronze, and each one is ground off-centre, one cutting edge being longer than the other—just a wee bit, not overmuch. The drills therefore cut a bigger hole than their rated size; and as they don't rub full length in the hole, they don't overheat, and don't seize up, while the chips and curls come away very readily. I always use plenty of cutting oil when drilling tough bronze. Did I hear somebody saying that the drills will make an oversize hole that won't take a full thread? Bless my heart and soul, some folk can't see the wood for trees. What on earth is the matter with drilling a few trial holes in bits of scrap metal, and using a drill that cuts to the size of hole required? If you want a $\frac{1}{4}$ in. hole, and the drill stamped 15/64 in. on the shank, drills a $\frac{1}{4}$ in. hole, why, use it, and everybody will be happy!

If the holes for the safety-valve bushes haven't already been drilled, don't forget they aren't on the top centre-line of the boiler but $\frac{7}{16}$ in. each side of it, like those on the *Austere Ada* class, and $2\frac{3}{4}$ in. behind the centre of the dome hole. The little merchant at the back end is for the turret fitting. No bushes are needed in the backhead, as the fittings screw direct into the



How to braze backhead joint

$\frac{1}{8}$ in. plate, and none are needed in the smokebox tubeplate.

Final Brazing Job

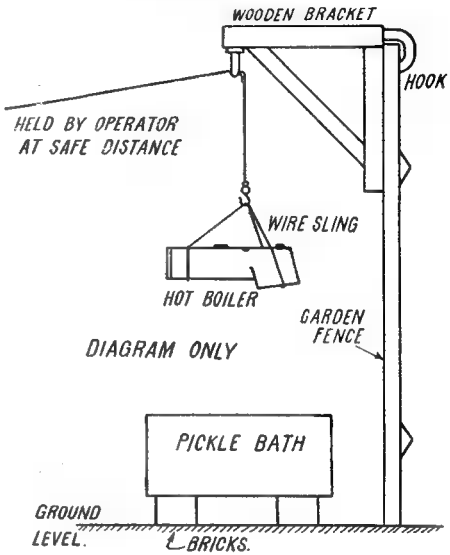
Noo I'm tellin' ye, as Sandy would remark, that the final brazing job *may* be a teaser, but at the same time it may not. It all depends on how you set about it. One operator with a single five-pint blowlamp, or an equivalent air-gas blowpipe, will have to be mighty careful as to how he packs the coke or breeze, to retain the heat; but if he can get a mate with another blowlamp—it need not be so large, a $2\frac{1}{2}$-pint would do—the job is made much easier. Maybe a pal could be persuaded to come along and help; or if your wife or girl friend is interested, promise of a box of chocolates (you'll have to save your coupons!) or some other gift, may procure her assistance. Incidentally, if the writer of those "Dont's" on page 366 of September 18th issue had started blowing off that sort of stuff in the munition shop I was running in the Kaiser's war, my girls would have "torn him up," in a manner of speaking, for insulting female intelligence, and I should have sided with them. Goodness only knows there are plenty of clever women in the engineering world (an example from our own pages is Mrs. Ivy L. Tracy, who runs the Burnerd Chuck Company) and any woman running a home, and who has a baby, could write a list of "Don'ts" for a man that would fill the whole of this issue! However, if you have to do the job single-handed, with just one blowlamp or air-gas blowpipe, I would recommend Johnson-Matthey's B-6 alloy, or a coarse-grade silver-solder, for the foundation ring and backhead joints, and "Easyflo" or best grade silver-solder for the bushes, and around the firehole ring. Not so much heat would be required. If you can get help, carry on with easy-running brazing strip. If an oxy-acetylene or oxy-coal-gas blowpipe is available, the job is as easy as soft-soldering, using Sifbronze. I'm doing mine the latter way.

Concentrate on the Corners

First cover the joints with wet flux, as before; then lay the boiler on its back in the pan, and pile up the coke or breeze almost to the level of the foundation ring. Fill up the firebox with asbestos cubes, or crumpled asbestos millboard, so that the combustion chamber joints are protected. Now get your blowlamp going good and strong, and carefully heat the whole lot, getting the coke around the foundation ring to glow bright red. Then concentrate on one corner. If you have a mate, the flame of the second blowlamp should meet the first at an angle, one blowing on the outside of the firebox, and the other on the inside. When the corner glows red, dip the brazing strip, or the B-6, whichever you are using, into the flux, and apply to the job in the flame. It it melts into a ball, the copper isn't hot enough. If it melts and flows directly it touches the copper, as it will if the heat is correct, let enough flow in to fill the groove and form a fillet; then move the flame along a little, and wait a minute for the fresh metal to attain correct heat before feeding in more brazing material. If a second lamp is being used, tell the holder to be careful, and always keep the flame following your own, so that the metal is always between the two. Then, following this "technique," work you way right around the ring, paying particular attention to the corners, and covering all the rivet heads, both inside and outside the firebox. *Don't chance anything*: if you have the least suspicion that you have missed a place, or haven't put enough on, dip the brazing material in dry flux, which will stick to it, and put a bit more on the doubtful spot.

Have the holed tray or lid handy ; the one used for the smokebox tubeplate job, which should be propped up all ready. As soon as the circuit of the foundation ring has been completed, grab the boiler with the big tongs, and put the barrel through the hole in the other pan, letting the throatplate rest on it. As quickly as you can, to prevent the boiler cooling too much, pile coke or breeze all around the firebox wrapper, almost to the level of the backhead ; then get busy with the blowlamp again, on the bottom corner, as the boiler is already heated all over. The second flame, if available, should play on the same point from the opposite side. When the copper glows red, apply the strip again, or the silver-solder as the case may be ; and as soon as it melts and flows in, move the flame along a little, and ditto repeato as for the foundation ring, slowly working right around, and allowing enough metal to sweat in between wrapper and flange, to fill the joint completely. Go over every screw stub, as you proceed. After arriving at the other bottom corner, play the flame direct on the firehole ring flange ; and when this is red, apply either first grade silver-solder, or " Easyflo " to it. Either of them will melt and " flash " completely around, same as it did when fixing the tubes.

When you are quite certain that no places have been missed, lift the boiler up, and stand it in the brazing pan, right side up, propping up the front end of the barrel, so that it stands level. Then concentrate the flame on the dome bush, applying best silver-solder or " Easyflo " to it when red; finally, give each of the smaller bushes a fillet of the same material. Let the job cool slowly to black ; then scrape away the coke, and carefully lower the boiler into the pickle. Keep well clear of it, as there will be a miniature combined volcanic eruption and geyser display when the acid pickle enters the hot boiler. When I am putting hot jobs in the pickle bath, and they are not too heavy, I usually press the garden rake into service, and hold an old rubber lavatory mat between myself and the pickle bath, to keep stray splashes off my clothes or overall—they cost muckle siller the noo, ye ken—but it would take a mighty powerful wrist to hold *Britannia's* boiler on the end of a garden rake. A trick I did in days gone by, was to knock up a rough " gibbet " with a couple of bits of wood, screw a cup hook into it, and hang it on the garden fence, over my pickle bath, which was a wooden box lined with sheet lead, as I believe I've already mentioned. While the boiler was cooling to black, I put a wire loop under the barrel, and another under the firebox ; carried it out with the tongs, set it alongside the pickle bath, and put a hook attached to a long string, through the wire loops. The string was then run over the cup hook on the " gibbet " ; and from a safe distance, the boiler could first be raised, like a hangman of the Dark Ages settling the account of Dick Turniptops, and then lowering it into the pickle in the same way that nagging wives and other undesirable females were lowered into the river about the same date. They probably kicked up as much splutter as the boiler! However, leave the boiler in the pickle a little while longer than the said females were left in the river ; then rescue it with the tongs, give it a thorough wash in running water, and clean it up as before. It should then be O.K. for a " pinhole " test. Plug up all the holes (a big cork or bung will do for the dome bush) attach a tyre pump to one of the smaller bushes by aid of an adapter, put it in some water, and pump a few pounds of air in. A stream of bubbles will indicate a " pinhole," if there should be one. It



One way of avoiding acid splashes !

can be permanently cured by drilling a No. 55 hole at the spot, tapping 10-B.A., and screwing in a stub of 16-gauge copper wire, screwed to suit. Sweat over it when doing the stay heads later on.

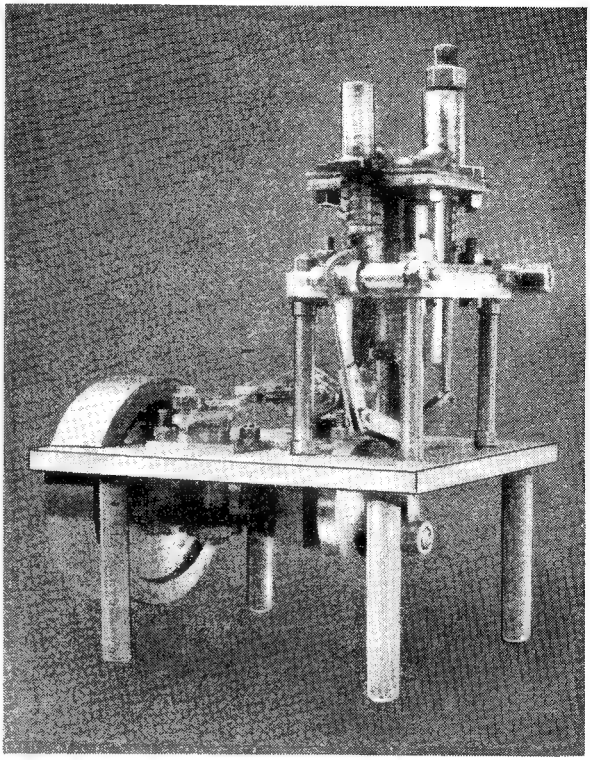
Several readers query the advisability of pickling a hot boiler. There is a medium in everything ; you don't want to put it in nearly redhot, or the joints may crack with the sudden cooling, but at the same time it should be hot enough to " fizz," or the metal won't be properly cleaned from scale and burnt flux. I let them stand two or three minutes after all the red has died away ; and so far, have never had a faulty joint. Next stage, staying.

Tail Lamp

Replying to Bro. Hyphen (page 480, October 9th issue) *Tich* represents a privately-owned contractor's or industrial " works " engine, used purely for shunting on private premises, and never goes out on a running line ; therefore, one lamp-iron on each beam is all that is required. Illustrated catalogues of industrial locomotives in my possession, confirm this. The 2F is a " company " engine, and although primarily intended for shunting, occasionally has to use running lines, and, therefore, needs a full set of lamp irons, to carry destination or classification lamps. I'm always pleased to supply information to anybody genuinely seeking same!

An Unusual Poppet-Valve Steam Engine

by R. Howe



THIS engine, inspired by the illustrations and notes appearing in THE MODEL ENGINEER, No. 2528, November 3rd, 1949, was constructed solely as an experimental project.

It will be clearly seen I have fabricated throughout from scrap box oddments. The base, or bedplate, as you wish, is of $\frac{5}{16}$ in. dural, as also is the cylinder platform, both these items are faced off each side in the lathe.

The main bearings are built for a long and hard life. I do admit to a spell of over indulgence over this feature, but, of course, no harm has been done.

As per "L.B.S.C."

Crankshaft and crankdisc, of mild-steel, are brazed prior to turning between centres. Front (crank end) bearing is $\frac{3}{8}$ in. dia. and the flywheel end is 1/32 in. less. My flywheel, also of mild-steel—it was a handy slice sawn off a bar end—is 3 in. × $\frac{3}{4}$ in. face, and is fitted in the manner of friend "L.B.S.C.'s" locomotive driving wheels, and was finish turned after pressing home. A few threads are cut on the end of the shaft in order to facilitate adaptation of a coupling dog at any time. The crankpin is screwed, with tight-fitting threads, into position. The connecting-rod of flat section mild-steel, has a phosphor-bronze block brazed to each end. After cleaning up, the holes for gudgeon and crankpins were drilled and reamed whilst holding in the drilling machine vice, thus ensuring full alignment and parallelism of the bores.

The piston is of cast-iron, bored to a shell, and fitted with a yoke of dural to carry the gudgeon. Rings are not considered necessary; I simply turned about four fine oil retaining grooves at roughly equal spacing.

The cylinder platform is bored to a tight fit around the cylinder, and this bore is eccentrically grooved to collect the exhaust steam—or air—from the row of uniflow ports drilled in the cylinder wall. The cylinder has two square, brass, flanges, one of which holds down the cylinder, and the other one carries the cylinder-head. Bore and stroke, by the way, are 1 in. each. Paper gaskets are used in the latter joints.

The valve chambers are of bronze, and stainless-steel was selected for the valves, which have long, oil-grooved stems. Valve springs are quite light, being wound up from only 18-gauge piano wire.

Valve-operating gear

Quite considerable time was spent both in sketching and at the workbench, on reaching the stage of the valve-operating gear. Eventually, the bell-crank type levers were hung on to what are really $\frac{1}{16}$ in. stroke crankshafts in clamp bearings. This movement is a little more than sufficient in the way of valve lift adjustment, and to provide the last timing, I find a pivot position on the connecting-rod a little below the half-way mark is satisfactory.

Hidden away in the rear of the picture is a feed water pump, driven through 6-1 ratio gearing, the worm-wheel is carried in a vertical bearing.

Lively reaction is obtained on either steam or compressed air. I have run on steam at 100 p.s.i. down to zero, and at the Sheffield M.E.S. this year an interesting performance was given on air, at from 5 lb. to 30 lb. Even a bicycle pump will turn the engine over three or four revolutions.

I am indebted to my friend, Mr. L. Stoney, for taking the photograph.

Making a Workshop Camera

by "Dioptre"

NOW that the chassis has been completed, it remains to make the camera proper, consisting of : the front, the centre support for the bellows, and the camera back ; these can be clearly seen in Fig. 40.

Continued from page 506, "M.E." October 16, 1952.

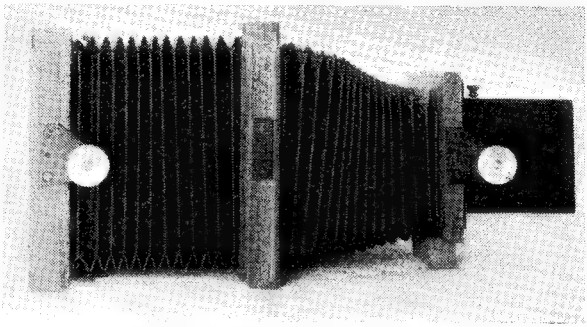


Fig. 40. The finished camera ready for mounting on its chassis

The Camera Front—(S)

This comprises the front panel together with its fittings, which is carried in the fork of the front slide. As the body (*Sa*) of the panel is of stout construction, it can quite well be made from a single piece of well-seasoned mahogany, but those who are

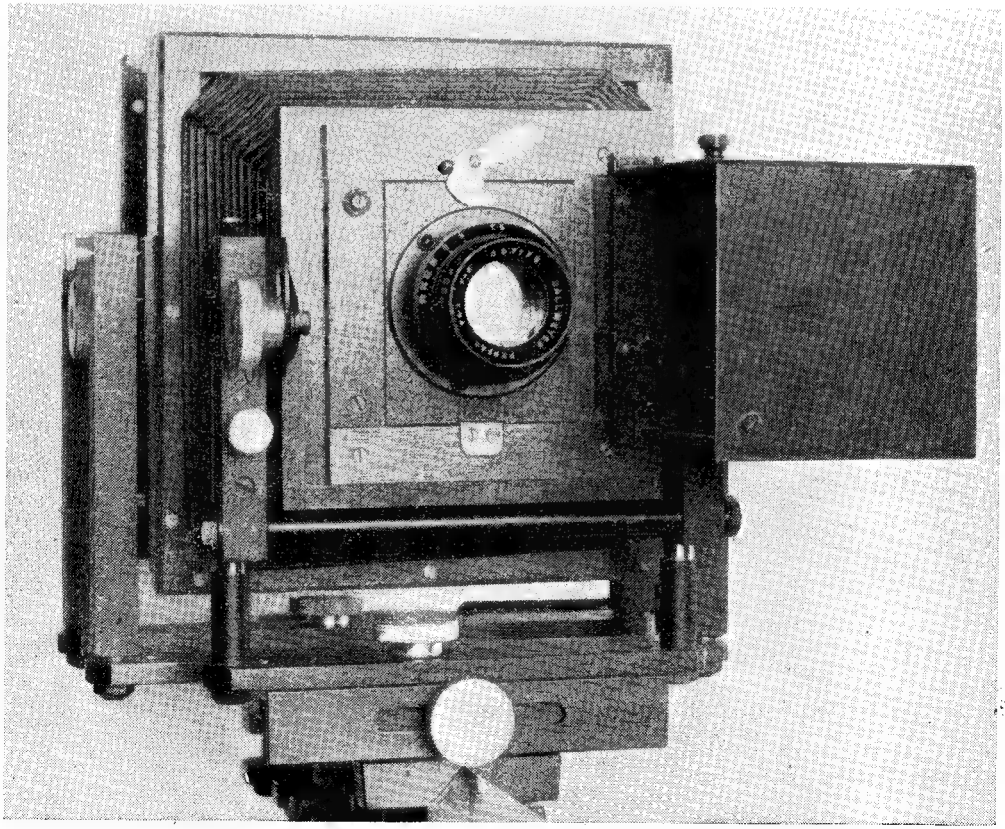


Fig. 41. The front and lens hood

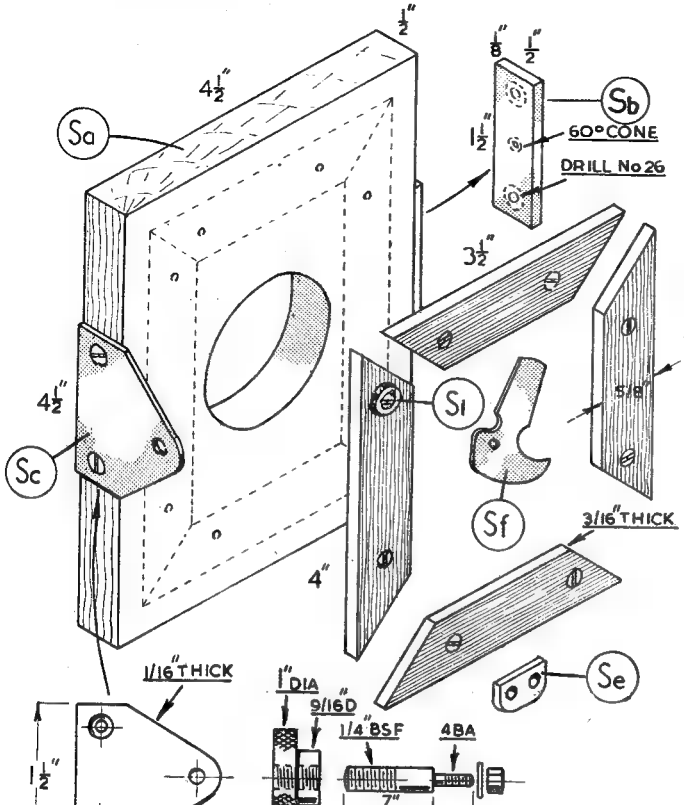


Fig. 42. The camera front. "Sa"—the frame; "Sb" and "Sc"—the side plates; "Se" and "Sf"—the lens panel fixings; "Si"—the hood stop

adept at cabinet work will, no doubt, prefer a mitred frame, rabbeted to take the lens panel. Where the panel is made from the solid, a rabbet is formed by attaching a light framing to the face of the panel itself. The reason for making the panel in this way was that a standard size of lens panel had already been adopted for use in other cameras, and it was found easier to ensure a close fit by building up the rabbet to match. A pivot plate is attached to either side of the frame; that on the left side (*Sb*) only forms a bearing for the pivot-screw, but on the right side the plate (*Sc*) is extended in order to carry a stud and clamp-nut for locking the tilting movement of the camera front.

The lens panel is not illustrated, as it will be made to suit the particular lens fitted to the camera; single-piece construction will usually serve, but a built-up frame is preferable if there is any danger of the wood warping. To make a light-tight joint, strips of narrow, velvet ribbon are glued to the back of the lens panel. The bottom edge of the panel is held by a small, brass plate (*Se*), and at the top an L-shaped latch (*Sf*) is pivoted to the woodwork. To give a good appearance, these brass fittings should be polished with fine emery cloth and then lacquered.

The Lens Hood—(Sg)

This may be regarded as an optional fitting, for it may not be necessary for indoor photography and where a coated lens is used; nevertheless, it will prevent any light from cross windows reaching the front of the lens and causing unwanted reflections. In any case, the hood will not be found inconvenient in working and it has the advantage, perhaps, that it cannot be shut unless the capping shutter is closed and the finger level of the iris diaphragm turned to stop down the lens. This hinged form of lens hood was fitted to enable a simple capping shutter to be used, but where a between-lens shutter is incorporated in the lens mounting, a conventional form of tubular hood will probably be preferred. The hood is bent to shape from a strip of aluminium, and the tie-bar is fitted so as just to clear the shutter lever with the cap closed. Any simple kind of hinging can be employed, but that illustrated consists of a pair of pintles fixed to the hood and engaging the two eyes attached to the hinge-plate (*Sh*). A coiled toggle spring is anchored to the hood and to the hinge-

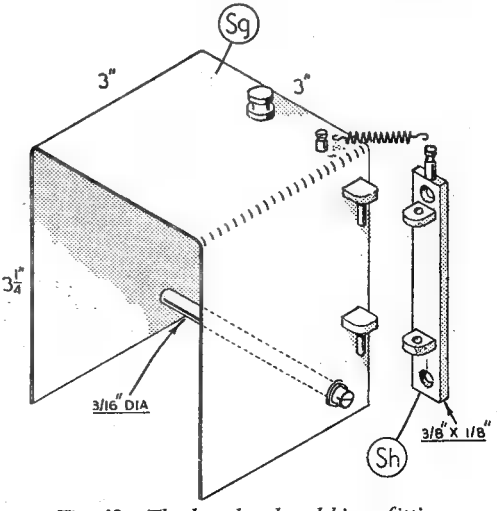


Fig. 43. The lens hood and hinge fittings

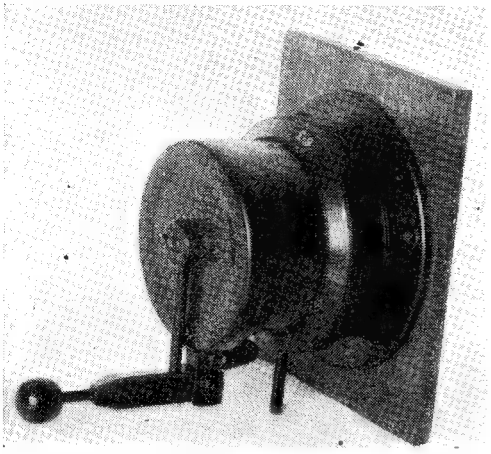


Fig. 44. *The capping shutter mounted on a Dallmeyer lens. The iris ring has been fitted with a finger lever*

plate; this serves to keep the hood in either the open or the closed position, even when the camera is pointed downwards. The hood closes against a stop (*Si*) attached to the woodwork. The inner surface of the hood should be treated with dead-black paint to prevent light being reflected on to the surface of the lens. In addition, a small knob for opening and closing the hood will save the black, external finish from being worn by the fingers.

Good quality anastigmat lenses without shutters can usually be bought secondhand quite cheaply, and the use of an external shutter, or a simple lens cap has the advantage that there should then never be any doubt as to the lens being covered when the darkslide shutter is opened. In fact, for uniformity of working and to prevent mistakes, it may even be found better to use a cap on a lens fitted with a built-in shutter, as for indoor photography the exposures are usually of several seconds duration.

When the ¼ plate camera is used mainly for photographing objects up to some 2 ft. in length standing on a table or bench, a lens of 6 in. focal length is, perhaps, the most convenient size, and an aperture of f./6.3 will afford adequate illumination of the focussing screen.

For photographing larger objects on the bench, a lens of 5 in. focal length may be found more convenient, as the distance between the subject and the camera is then reduced. To avoid an appearance of exaggerated perspective, a lens of 7 in. or 8 in. focal length may be found an advantage when photographing small objects at very close range.

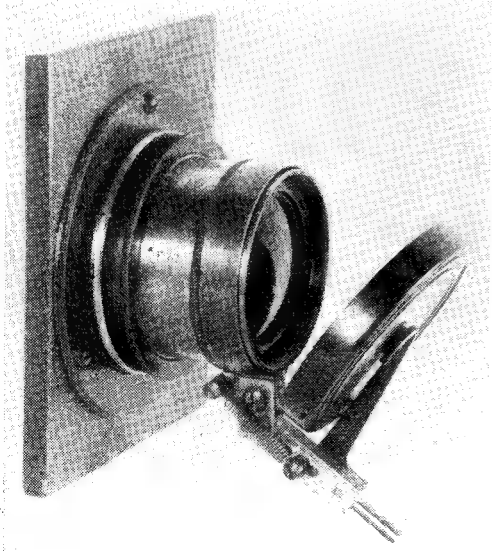


Fig. 45. *The capping shutter fitted to an Aldis lens*

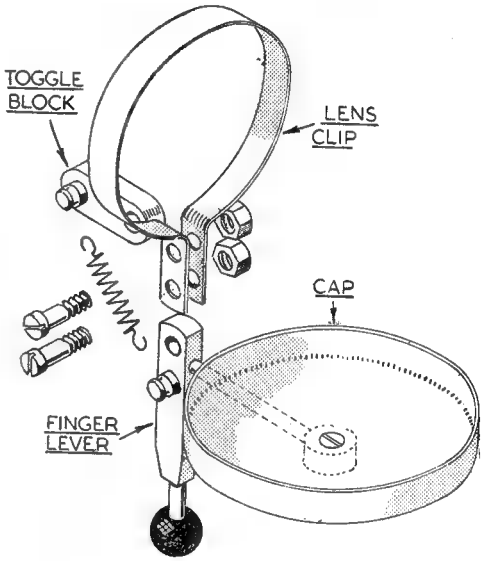


Fig. 46. *Constructional details of the shutter*

A coated lens has some advantage in giving a brighter picture, and also in cutting down the flare that may result from using a brightly illuminated, white background.

The two illustrations of shutters fitted to different lenses represent a simple form of construction that enables the shutter to be operated without difficulty when the lens hood is closed.

A clip of spring steel is shaped to encircle the lens rim, and to this is secured, by means of a cross-bolt, a small rectangular block for anchoring the toggle spring which maintains the cap in either the open or shut position. The limbs of the clip are extended to form a bearing for the finger-lever carrying the lens cap. When the clip is tightened, it should just grip the rim of the

lens mount and hold the shutter in place; if necessary, a packing-strip of thin card can be used to distribute the pressure evenly and to protect the lens mount.

On no account should the clip be fitted too tightly, or the lens may be damged. The cap is either built up, machined from the solid, or a plastic jar cap or small plastic box lid may be found suitable for the purpose.

To obtain a light-tight joint, the cap should be lined with velvet, and the easiest way, perhaps, to do this is to cut a cardboard disc to fit loosely within the cap; the edges of the velvet are then turned over and glued to the back of the card, and when dry the disc is pressed lightly into the cap.

There are, of course, many other ways of making a capping shutter, but the one illustrated has been found easy to make and operate; moreover, it is small in size and can readily be fitted within the lens hood described.

(*To be continued*)

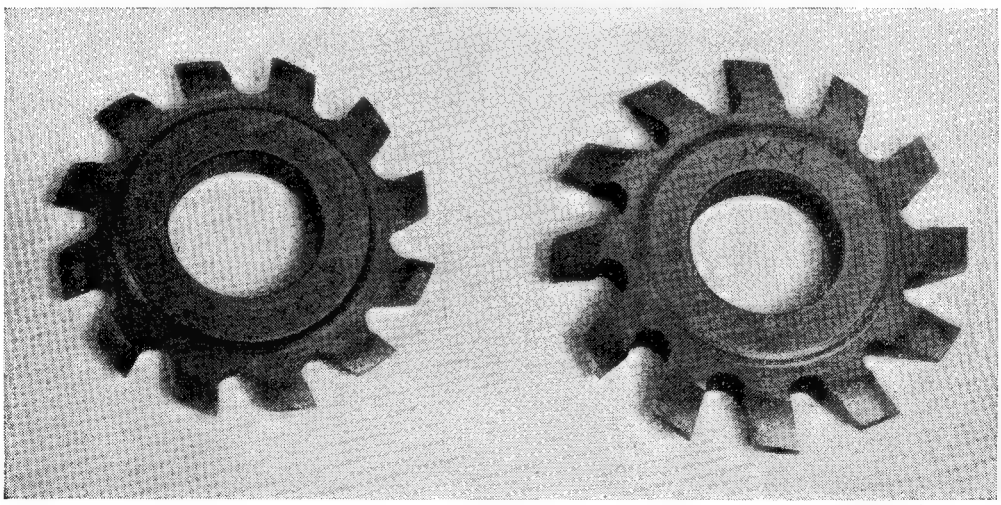
SMALL GEAR CUTTERS

WE have received from Mr. J. K. Mold, of 80, Norwood Road, Wallasey, Cheshire, samples of small 20 d.p. and 40 d.p. gear cutters of his manufacture.

The machining of these cutters is, we are told, carried out in the device described by "Duplex" in issues of THE MODEL ENGINEER beginning on May 19th, 1949. This lathe attachment, readers may remember, is furnished with an eccentric rocking gear which automatically relieves the cutter and, at the same time, the correct curvature is given to the tooth flanks by means of a specially-made form tool.

When tested on the surface plate, the faces of the cutters were found to be flat. On revolving the cutters on a dead-centre, represented by a well-fitting shouldered arbor, the run-out at the crests of the teeth did not exceed one thousandth of an inch, and the same figure was obtained when testing the truth of the cutters at the flanks of the teeth. It would appear, then, that the machining is within normal limits of accuracy, and that no appreciable distortion has occurred during the hardening process.

The cutters are tempered to a dark-straw colour and the colouration is uniform throughout.



Two of the sample gear cutters of 20 *and* 40 *diametral pitch*

The cutters under review appear to be accurately machined, and the flanks of the teeth have a high surface finish with sharp cutting edges. Should the cutters need resharpening the honing jig, described in the articles referred to, can be used to stone the upper surface of the teeth equally and without altering their form.

The teeth of commercial cutters are usually finish-ground after hardening, in order to correct any warping that may have occurred.

Each cutter is engraved with its tooth pressure angle, diametral pitch, and the number of teeth it is designed to cut.

Cutters manufactured by this simplified process are not subject to the high overhead cost resulting from the installation of expensive generating and profile-grinding machinery; for this reason, perhaps, the selling price of the cutters reported on compares very favourably, we are informed, with that charged for the ordinary commercial pattern.

PRACTICAL LETTERS

Engineering under Difficulties

DEAR SIR,—I have read with interest the article "Climbing the Glass Mountain" in your issue of July 17th, 1952, and I would like to call your attention to the article published by *Engineering* on January 7th, 1948, entitled "An Engineers' Work in Japanese Prison Camps."

The machine referred to in the article was designed and built by me for a purpose and had a great deal of use during the years of captivity and the article gives something of the background to the work.

I was able to bring the lathe home (it was exhibited at the 1946 "M.E." Exhibition and also at the 1948 Machine Tool and Engineering Exhibition at Olympia) and I have some excellent photographs of it given to me by *Engineering*, and also some official photographs taken when Lord and Lady Mountbatten visited the Far East P.O.W. camps in September 1945.

Yours faithfully,

Pleshey. R. BRADLEY.

Tape Recorders

DEAR SIR,—Some readers are engaged in making tape recorders similar to, or based on my own, recently described in THE MODEL ENGINEER.

One of the main difficulties in getting such equipment to work satisfactorily is that until the playback equipment is working well it is impossible to adjust the recorder, and vice versa. This can be overcome by borrowing a recorded tape made on another machine known to be satisfactory, and adjusting the playback portion until good reproduction is obtained. It is then much easier to line up the recording circuits to give the desired effect.

If any readers engaged in making a recorder similar to my own care to get in touch with me, I would be prepared to record a length of their tape with a suitable test signal.

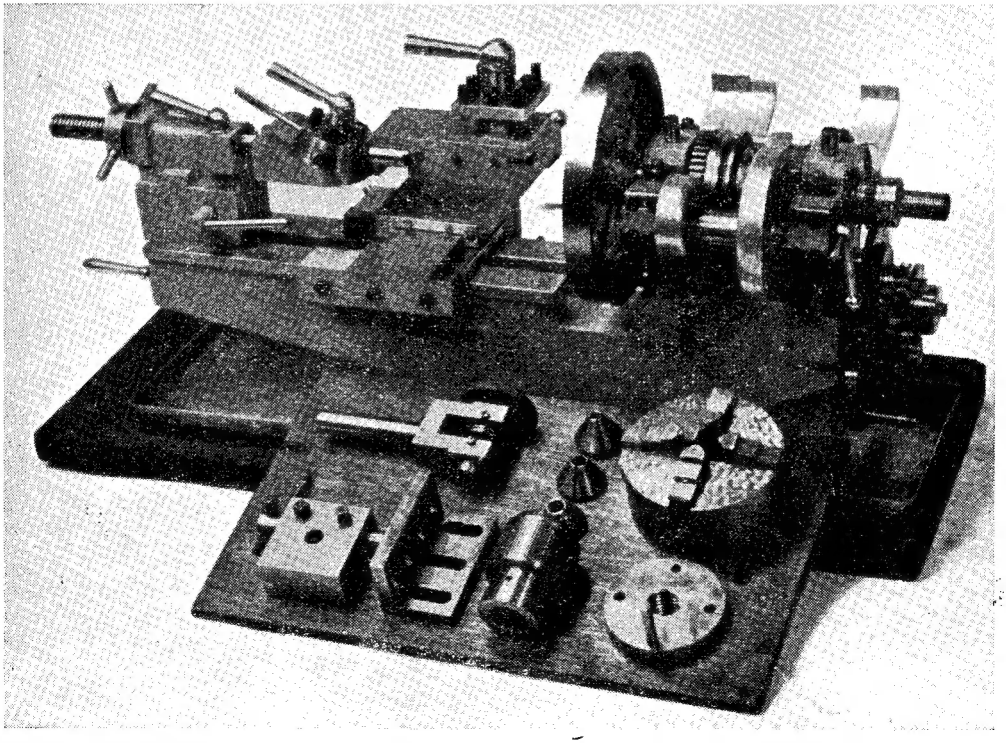
Yours faithfully,

Pinner. RAYMOND F. STOCK.

Twist Drill Grinding Jigs

DEAR SIR,—Judging by recent letters and articles appearing in these columns since my last communication on this subject, a model engineer cannot even start to drill holes until he has made a precision drill grinding jig. It looks as if he cannot even trust a new drill straight from the makers, as they are hopelessly inaccurate. It is obvious that the makers employ some "mutt" to grind them freehand.

In my original letter I did not criticise any of these grinding jigs, I only deplored the time



Mr. R. Bradley's lathe, constructed in a Japanese P.O.W. camp

spent in making them. But as I seem to have been well and truly sat on by all the jig experts, I am now going to start criticising the jigs themselves.

Now THE MODEL ENGINEER has published, in the course of its life, quite a few twist drill grinding jigs, and I presume that the very first one was claimed to do the job properly. If that is so, what is THE MODEL ENGINEER doing using its valuable space on this dismal procession, each designer implying that his is better than the previous one? Apparently, the last one to be described, namely, the one designed by Mr. Arnot is better than all the previous ones.

Yet Mr. Arnot himself says " —and those who have thought about making a jig will appreciate how slight a variation can destroy its utility. It is really a very difficult thing to make to be effective."

The average model engineer's stock of drills is quite likely to cover sizes from No. 80 up to 1 in. diameter, but I don't think even Mr. Arnot will claim that his latest model will make a good job of grinding throughout this range. Therefore, it becomes necessary to make two jigs, one to deal with small sizes, and another to deal with large.

No hard feelings, please, Mr. Arnot; yours happens to be the latest article to appear on this subject, so I am bound to quote you. I assure you that I have the greatest appreciation of your efforts to design an efficient jig.

I guess it won't be long before another improved jig makes its appearance in these pages, and I pity the poor reader who tries to keep pace with all these designs. No sooner has he laboriously put the finishing touches to one jig than another vastly improved version comes along and he has to start all over again. It looks as if we are all condemned to a lifetime of making twist drill grinding jigs. (I am becoming tired of writing these four words so in future I will refer to them as T.D.G.J's.)

All the big twist drill manufacturers must have T.D.G.J's at least as good as the designs published in THE MODEL ENGINEER, and yet as Mr. Arnot states, and I agree with him, they do slip up and quite often produce a bad drill, and I think this is almost certainly due to the human element.

Now all this boils down to the fact that no one has, so far, produced a T.D.G.J. that will do the job perfectly and be proof against any errors made by the person using it. In other words, the person using the jig must acquire a certain amount of skill before he can get good results.

Therefore, I repeat my previous statement that as far as the average home worker is concerned, he would be better advised to become skilled in grinding by hand.

I think it is about time I got down to the practical business of drilling holes. Well, just suppose that we have a perfectly sharpened drill which is capable of cutting a dead-size hole. Let us take Mr. Arnots' own example of a $\frac{5}{8}$ in. diameter drill, which should feed at 10-15 thou. per rev in mild-steel. It requires very great pressure to get a drill to cut at this rate of feed, or at anything approaching it, so this means that the drilling machine is bound to flex and distort, all the more so if it is the rather flimsy type that exists in most home workshops. This means that although the hole may be dead to size, it is not square with the machine table. I think this is a worse error than having an inaccurate size hole that is nevertheless square with the table.

I have earned my living for quite a few years as a toolmaker, and have I drilled some holes! And what is more, I can truthfully say that I have never worked in a firm that possessed a T.D.G.J.! Neither myself or any of the chaps I have worked with in the toolroom have ever had any undue difficulty in making accurate holes, and when making press tools, drilling jigs and fixtures, the holes have not only to be accurate for size, but they also have to be *round*, parallel with one another, and in the exact position. Also, the holes are often in a thick chunk of high carbon steel or tough alloy steel.

The procedure is this: first a small pilot hole is drilled, about half the diameter of the finished size, then a drill the smallest amount under the finished size is put through. As the pilot hole is already drilled, the second drill only needs very light pressure, and will cut square with the table. Finally, a reamer, or D-bit of the correct size is used to make the hole dead on size and truly circular.

I have been very surprised that no one has mentioned the use of reamers in this controversy; after all, it is standard workshop practice, and even Mr. Arnot, in his very first paragraph, states that " drilling is a roughing operation in most cases."

If as so often happens, there is not a correct size reamer or D-bit available, almost as good a result can be achieved by finally putting the correct size drill through. As it is only going to cut a few " thou.", it is not very important if it is ground slightly off centre or with unequal lip height. If on this final drill the extreme outside tip of the cutting edge is stoned to give a very slight lead to the drill, it will cut so close to size that it will bind. It is as simple as ABC really —isn't it?

Yours faithfully,

Orpington. G. LINES.

Universal Dividing Head

DEAR SIR,—I have been a reader of THE MODEL ENGINEER for over 30 years, and I have never had any reason to write you before, but after reading the letter by Mr. E. Hall re the " Universal dividing head," by Mr. Turpin, I feel I would like to write in defence of Mr. Turpin.

I constructed the dividing head to instructions, the only difference being I did not use castings, but fabricated the parts instead. I also made up three extra division plates (15, 16, 17, 18, 19, 20), (21, 23, 27, 29, 31, 33) and (37, 39, 41, 43, 47, 49), and have had no trouble.

Up to now, I have cut all the gears for the $1\frac{1}{2}$ in. scale model traction engine from drawings supplied by Bassett-Lowke Ltd., including two bevels and two pinions.

I would like to state that I have received much pleasure from THE MODEL ENGINEER, even in the days before I could afford a lathe of my own.

Yours faithfully,

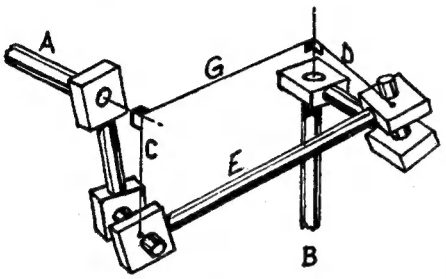
Swindon. C. G. THOMAS.

Right-angle Driving Mechanism

DEAR SIR,—The necessity for a simple drive between two shafts set at right-angles to each other and which, when extended, do not intersect, must often confront some of your readers.

Here is a simple solution to some problems and conditions which I feel deserves more publicity. It was devised by Mr. G. T. Bennett about 1903.

In the diagram, shaft *A* is set at right-angles to shaft *B*. The crank arms, *C* and *D*, are made equal in length. The length of connecting-rod *E* equals *G*, the true distance between the axis of shaft *A* and the axis of shaft *B* (produced if necessary).



The right-angle drive mechanism described by Mr. A. E. Winnett

The pivots of the conventional crank arms *C* and *D*, are given equal twists about the arm longitudinal axes only, and in the connecting-rod, the pivots are set at 90 deg. to each other. The angle of twist in the arms *C* and *D* is obtained as follows :

Divide the length of arm *C* by centre distance *G* and the result is the sine of the angle of twist,

or Sine $= \frac{C}{G}$

I believe this linkage will operate between shafts set at an angle other than a right-angle, provided the twist in *E* is equal to that angle, but I have not used the linkage in this condition.

One outstanding feature of this drive is the fact that there is no dead centre ; complete control from one shaft to the other is obtained throughout each revolution in either direction.

The connecting-rod may be formed to clear intermediate obstructions—another useful feature.

For a limited oscillatory movement between shafts set at any angle where there is an obstruction which cannot be cleared by forming the connecting-rod, this rod may be hinged anywhere along its length with the hinge pin at right-angles to the longitudinal axis, provided the sum of the angular twists in the two parts equals the angle between shafts *A* and *B* and

$$\frac{\textit{Length crank A}}{\textit{Sine of its angle of twist}} = \frac{\textit{Length 1st part con.-rod}}{\textit{Sine of its angle of twist}} = \frac{\textit{Length 2nd part con.-rod}}{\textit{Sine of its angle of twist}}$$

Other points to note regarding these linkages are :

There is no limit to load transmittable.

Not constant velocity ratio.

Mathematically correct.

Correctly fitting rigid pivots are used.

These linkages need to be seen to be believed in view of their simplicity, and usually give rise to incredulous laughter ! Even when constructed from paper clips, provided rigid pivots are formed on the wire, the action can be demonstrated.

Best wishes to all concerned with producing THE MODEL ENGINEER.

Yours faithfully,

Hayes. ARTHUR E. WINNETT.

Steam Organs

DEAR SIR,—With reference to the recent research by readers of THE MODEL ENGINEER into the origin of the " Calliope " or steam organ, the following recital is extracted from *The Illustrated London News*, dated December 3rd, 1859. :

The Calliope

" A musical instrument known by the above name has been lately brought over from America by the inventor Arthur S. Denny, and is now being exhibited for the first time in England in the central trancept of the Crystal Palace. It may be characterised as a steam-organ, and consists of a framework of iron supporting two cylinders, upon which are arranged a series of brass tubes, answering to the open diapasons of an organ, but bearing a strong resemblance to the ordinary steam-locomotive whistle. From a boiler situated beneath the flooring, the steam is conveyed into the cylinders, and from them admitted to the pipes, which produced the notes, through double balance valves, opened by levers in connection with wires acted upon by ordinary pianoforte keys, or by pegs on a set cylinder similar to that of a barrel organ. The instrument at the Crystal Palace is the softest toned ever made, and is played upon at a pressure of 5 lb. to the square inch—the maximum pressure employed in the church organ being but 5 oz.—the peculiarity of the invention consists in the fact that instruments are constructed in which the force of steam may be increased to the extent of a hundred and fifty pounds to the square inch, producing musical sounds thirty times as powerful as those of the ' Calliope ' now exhibiting ; and such is the volume of sound given forth at this high pressure that the instrument is asserted to have been distinctly heard at a distance of 12 miles. The compass of sound is almost unlimited, from the soft tones of a musical-box to a power sufficient to afford music to a whole city.

" On account of the quantity of steam given off during the performance, the instrument has not been hitherto available for indoor exhibition, but if, in place of steam it be used with condensed air, better music is produced and an equally powerful effect.

" Various are the uses to which it is suggested the power of the Calliope may be applied, amongst others as a means of conveying the orders of a General on the field of battle, by signals to be heard by the whole army : it is also capable of being used as a substitute for a chime of bells, and in St. Louis and New Orleans it has often been

employed in this manner, a lighthouse belonging to the English Government, and situated on the coast of Novia Scotia, is provided with a Calliope for making signal, the Pacha of Egypt has one fixed on board his private steamer, as a musical instrument, and in this way they are frequently used in the United States.

"Although the harmonies are, from the employment of steam, not always perfect, still the effect of a melody is decidedly pleasing to the ear; and, as a musical novelty, the Calliope must be considered to possess many claims to the attention of the public."

I apologise for the belated appearance of this information, but it was only by chance that I happened to come upon it.

Yours faithfully,

Croydon. J. DARTNALL.

CLUB ANNOUNCEMENTS

North London S.M.E.

At the Society's October general meeting, the timing device being constructed for the model car multi-track was explained to the members; and certain design difficulties brought forth a good crop of suggestions.

This was followed by selected members giving a description of their model engineering interest, coupled with an explanation as to why they do such things!

Future general meeting dates:

November 7th. Grinding demonstration by Mr. J. E. R. Wuidart. December 5th. "Rail Cars" by members of the car section. All to be held at Eastern Gas Board offices, Station Road, New Barnet, at 8 p.m.

Hon. Secretary: W. W. RANSOM, 14, Betstyle House, 197, Colney Hatch Lane, N.10.

The Sussex Miniature Locomotive Society

A general meeting has been called to be held at "Beech Hurst," Haywards Heath, and later in the Band Room at the Public Hall, South Road, Haywards Heath, at 4 p.m., on Saturday, November 1st. This will enable members, existing and prospective, to inspect the site, where members of the committee will be available to show strangers around and direct them to the meeting.

One of the chief items to be discussed is the election of a track manager and committee to erect, and, ultimately, manage the track.

"Beech Hurst" is within 10 minutes walk of Haywards Heath station, and is opposite the hospital, near the top of Paddock Hall Road.

Tea will not be provided at the hall, but there are cafes in the district, and visitors are asked to notify Mr. Bostel, Bostel House, 8, Cranbourne Street, Brighton, 1, if they will want tea and what time they would like it.

South London Model Engineering Society

The next Sunday morning meeting of the above Society will be held on Sunday, November 2nd at the White Horse Hotel, Brixton Hill, S.W. at 11 a.m.

This meeting will be a rummage sale and all members are requested to bring along for disposal those bits and pieces for which they have no further use.

Wednesday evening meetings for November, starting at 7.30 p.m., will be November 5th, when the Boat Section, led by Mr. E. Cassenet, will describe some of the boats which have been in the news during the Society's season of 1952.

On November 19th the Locomotive Section will hear Mr. E. Philpot describe some of the outstanding runs of this section during 1950.

Full particulars of membership from Hon. Secretary: W. R. COOK, 103, Englehart Road, Catford, S.E.6.

The Bath & District Society of Model and Experimental Engineers

The Society's objects are to bring together those who are interested in model or experimental locomotives, boats, engines, or mechanisms, or in electrical apparatus, or in tools and workshop equipment, or in any kindred subject; to facilitate the exchange of information and ideas on these subjects by means of lectures, discussions, visits, technical film shows, and other appropriate activities; and, in general, to promote mutual assistance and good fellowship amongst its members.

Meetings are usually held on Fridays at 7.45 p.m., and take place approximately monthly. Visits are normally made on Saturday afternoons and transport by coach is arranged when possible. Considerable time is set aside at most meetings for general discussion, and members are encouraged to bring their work in progress or anything else of interest. Visitors may be introduced at ordinary meetings, but may not attend more than four times per year.

Membership is by no means confined to actual modelmakers or engineers, and anyone over 16 years of age, who is interested in the Society's activities may apply for election to senior membership. The beginner is just as welcome as the more experienced member. In certain circumstances, persons between 13 and 16 years of age may be elected to junior membership.

If any local readers think the Society's programme might be of interest, why not come along? You will be welcome at our next few meetings, details of which may be obtained from the Secretary.

Hon. Secretary: A. SMITH, "Redtiles," Rodney Road, Saltford, Somerset.

Mortlake and District Model Engineering Society

The above club has been in existence in its present form for only a short while, but the members are, without exception, enthusiastic, the models owned by members ranging from steam-driven scale warships and various large electrically-powered ships to small diesel-driven models. The club want to embrace the stationary engine, model railway, and model race car hobbies, also.

Hon. Secretary: H. MARTIN, 67, North Worple Way, Mortlake, S.W.14.

Bletchey District Model and Experimental Society

The above Society was re-formed and it held its first meeting recently. During the business of the meeting, it was decided by a majority vote to change the name of the Society to the Bletchley District Model and Experimental Society.

The Society is to take the form of sections on such hobbies as, miniature railways, yachts and boats, aero modelling and traction engines. Later, it is hoped to form a section on research, bringing in photography, radio and science.

Anybody wishing to become a member or obtain further details of the Society should get in touch with the Hon. Secretary: MR. K. PEERLESS, 4, Ashfield Grove, Bletchley, Bucks.

Stephenson Locomotive Society

On Sunday, August 31st, a Midland Area Rail Tour over the 9-mile Western Region Moreton-in-Marsh—Shipston-on-Stour branch (closed to passenger traffic since 1929 and now usually traversed by a daily freight train) attracted 143 members and friends. The four-coach special train was, by request, hauled by ex-M.S.W.J.R. 2-4-0, No. 1335, departing from Oxford. A good run was made down the erstwhile Oxford, Worcester & Wolverhampton main line to Moreton, where after reversal and a short stand, the special set off along the branch, the obsolescent locomotive shattering the rural solitudes with her sharp exhaust whilst tackling the heavy gradients with vigour; foliage on the hedgerows scraped along the carriage sides. At Shipston the engine ran round the train and posed for the many photographers; on the return journey she stalled on the stiff climb near Longdon Road, but thanks to excellent handling No. 1335 stormed the obstacle and arrived back on the main line in good fettle. Through some of the most beautiful country in the Midlands the train retraced its trail as far as Yarnton Junction, whence No. 1335 propelled it over the historic ex-L.N.W.R. loop line to Oxford Road Junction, so returning to the General Station in the University City by a novel route, crossing over to the W.R. main tracks at the North Junction, as do L.M.R. trains from Bletchley direction now that the former L.N.W.R. station is closed.

Opening an extensive programme of indoor meetings and social functions arranged by the various centres for Autumn and Winter, Mr. R. A. H. Weight recently gave his popular lantern lecture, "Great Northern Cavalcade," to members of the Sheffield branch.